# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices. ©1979 by CW Communications/Inc.

Vol. XIII, No. 39 September 24, 1979 $1.00 a copy; $25/year

| TYPICAL JOB TITLES | AVERAGE YEARS EXPERIENCE | AVERAGE U.S. SALARIES (Average Highs) | SALARY CHANGE FROM '78 |
|---|---|---|---|
| MIS Director | 14.3 | $38,100<br>($44,000) | + 5.2% |
| Data Base Manager | 8.9 | $32,200<br>($36,300) | +10.1% |
| Systems/Software Programmer Managers | 6.8 | $28,900<br>($33,900) | + 9.2% |
| Systems Analyst | 5.6 | $26,300<br>($29,500) | +17.8% |
| Software Programmer | 4.1 | $23,200<br>($27,000) | +19.0% |
| DP Auditors | 3.1 | $22,500<br>($25,300) | + 9.5% |
| Telecommunications Personnel | 2.6 | $22,250<br>($25,000) | + 5.7% |
| Applications Programmer | 3.5 | $20,200<br>($23,250) | + 7.1% |
| Entry-Level M.B.A Grad | 0 | $18,150<br>($19,400) | +11.1% |
| Entry-Level B.S. Grad | 0 | $15,400<br>($16,330) | +29.0% |

Source: Fox-Morris '79 U.S. Data Processing Job/Salary Survey

## DP Salaries Never Better

**The demand for skilled DPers is still skyrocketing, and salaries are at an all-time high this year. Story on Page 2.**

# IBM Expected to Make Price Cuts on 30 Series

**By Connie Winkler**
CW Staff

NEW YORK — IBM is expected to improve the purchase appeal of the 30 series of large processors this fall either with a new CPU — code-named Newport — or price cuts on the existing 3031, 3032 and 3033 mainframes. These measures will clear inventory in anticipation of the mid-1980 announcement of the H series processors, according to Robert T. Fertig, vice-president of Advanced Computer Techniques Corp. (ACT).

The Newport is a variation of the 3033 with better price/performance, Fertig explained at a recent seminar sponsored by Martin Simpson & Co., Inc., a financial and market research firm.

A third option open to IBM would be to offer generous trade-in allowances on 30 series machines when the H series is announced, Fertig said.

Frank Halpern of Martin Simpson, however, believes the Newport will be coming soon with 80% of the 3033 power at 70% of the cost, making it similar to the 3032, which has not been a big seller. IBM always has a variety of options, and those include price cuts on the present models coming within a month or early next year, Halpern added.

### Avoiding Another Debacle

IBM, in setting up the H series announcement, doesn't want another debacle like that which followed the 4300 announcement in January of this year, Fertig said. Because of the 4300's much heralded lower prices and greater performance and because it is generally recognized as a new generation of computer technology, IBM customers are shying away from purchasing machines and waiting to see what the H series offers.

This drop in purchase activity has adversely affected IBM's revenues, and IBM doesn't want to upset profits, Fertig said.

With the expected October announcements, users can convert to the 30 series to meet their near-term needs, the consultant suggested.

Memory price cuts on the 30 series will also be attractive — ACT expects 1M byte of memory to drop from $75,000 to $30,000.

IBM has learned its lesson and the H series will probably not be as aggressively priced as the 4300, Fertig said. The cost of 1M byte of H series memory will be in the $25,000 to $35,000 range.

The H series, also known as Adiron-

*(Continued on Page 4)*

# Memory Seen Dominant in 2000

**By Molly Upton**
Special to CW

SAN FRANCISCO — "A large disparity between the logic speed and memory access time of large computers in the year 2000 will focus attention on the need for buffers and cache memory and, perhaps, innovations in memory hierarchy," Robert W. Keyes of IBM's T.J. Watson Research Center told a session at the Wescon/79 conference here last week.

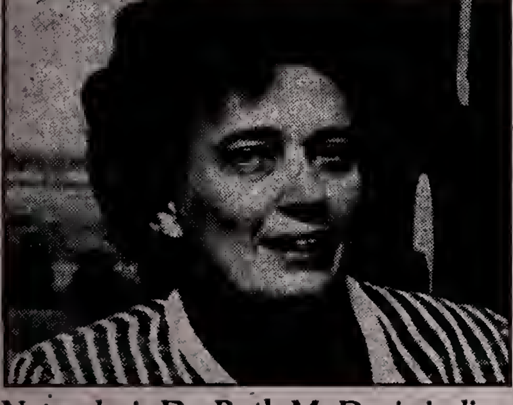
Memory will physically dominate these future computers, and steady increases in the power of large computers, driven by packaged logic delays approaching 100 picosec will occur during the next two decades, he said.

Despite the expectation that the size and level of integration of memory chips will increase in accordance with historical trends, the need for considerably larger memory size will "prevent the achievement of significant reductions in memory access time," Keyes observed.

He predicted the "relative amounts of silicon in memory and logic will evolve from approximate equality in contemporary machines to about 100:1 in 20 years. A somewhat similar

*(Continued on Page 5)*

## Double Honors



**Not only is Dr. Ruth M. Davis in line for a new job, she's been named the Data Processing Management Association's Computer Sciences Man of the Year. Story on Page 7.**

# IBM Still Trying to Oust Judge

**By Connie Winkler**
CW Staff

NEW YORK — For the fifth time in the course of the U.S. vs. IBM antitrust case, IBM is in the 2nd U.S. Circuit Court of Appeals seeking to reverse a ruling made by Federal District Chief Judge David N. Edelstein.

This time, IBM is reacting to Edelstein's ruling that he is not biased and prejudiced against IBM and therefore will not remove himself from the trial, the transcript of which is 90,000 pages long, and appoint another judge [CW, Sept. 17]. Edelstein's ruling on IBM's petition came down unexpectedly Sept. 11.

The following day, Edelstein refused IBM's request that the district court trial, which has been adjourned since April 10, be stayed further pending the outcome at the court of appeals.

On Sept 14, the court of appeals also rejected IBM's stay request, but set Oct. 16 for arguments on Edelstein's bias ruling. The appeals court said it could not grant IBM's stay request because IBM did not show it would be irreparably harmed if the request were not granted.

Following the higher court's ruling, the district court trial resumed later in the day. The trial is back in regular session and all parties, including Edelstein, who was harshly criticized by IBM for his conduct at the trial, behaved calmly and decorously.

In the short hearing in the court of appeals Sept. 14, IBM lead counsel Thomas D. Barr argued the district court trial should be stayed because IBM is being harmed by the continua-

*(Continued on Page 4)*

# Aggravation Can Pay Off

**By Emily G. Johnston**
Special to CW

One of the classic, though perhaps unrecognized, trade-offs in DP is aggravation vs. cost. You can often cut costs if you're willing to put up with a certain amount of aggravation. This is particularly true of a smaller installation such as mine.

By being shrewd and absorbing a fair amount of aggravation, I managed to hold down costs. In the process, I came up with the Johnston Principle of Uncertainty (with apologies to physicist Werner Heisenberg): The cost of people multiplied by the cost of equipment times the cost of aggravation is always constant. Let me illustrate. Two years ago, we were a totally IBM shop. Today, however, we have hardware from seven vendors — IBM, Digital Equipment Corp., Memorex Corp., Telex Computer Products, Inc., Computer Devices, Inc., Radio Shack and Lear Siegler,

*(Continued on Page 8)*

*CW Special Report on 'Stretching the DP Dollar' follows Page 64.*

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*Computerworld* can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

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## *Demand Exceeds Supply*

# Hot Prospects Seen for DPers

By Ann Dooley
CW Staff

PHILADELPHIA — The demand for skilled DPers continued to skyrocket this year, boosting their salaries to new highs.

The demand for DP professionals jumped 21.2% in 1979, while DPers' overall salaries rose 12.6%. The 1979 figures are nearly identical to those experienced in 1978, when demand rose 21.7% and overall salaries rose 12.4%.

The figures were obtained from Fox-Morris Personnel Consultants, Inc. here, which conducts an annual nationwide survey of DP job and salary conditions. In this year's survey, approximately 5,000 firms, spanning most industries, were polled.

In the Fox-Morris survey, applications programmers were found to be highest in demand — climbing 41% in employers' needs over the 12-month period. Software and systems programmers were second highest, registering a 35.1% growth in demand. Close behind was a 29% greater need for systems analysts.

Next highest in demand were telecommunications personnel, up 21.3% over the 1978 rate of demand, the survey found. Other high-demand specialists included in the survey were DP auditors, up 20% in demand over 1978, and senior programmer analysts, showing an 18.2% rise over last year's figures.

Also showing an increased demand by employers were data base managers (by 15%) scientific programmers (by 14.6%) and computer science graduates (by 9%). Employers also called for 8.1% more management information systems (MIS) directors this year than in 1978, according to the survey.

The demand for DP specialists remained uniform in all parts of the country, according to a Fox-Morris spokesman, although the Midwest showed the most growth. Survey data did not indicate what caused the increased growth in that geographic area.

In each of the 50 states, the demand-over-supply ratio remained constant.

Salaries, which rose sharply overall, were reported to be highest and the demand also the greatest in DP vendor firms, particularly in software and service firms. Fox-Morris attributed the increased demand in that industry to the widespread use of small computers. Smaller firms without a DP department must rely on a software house or service firm to write programs and take care of their systems, resulting in the need for more top-level DP personnel in the DP vendor companies.

> *'Salaries . . . were reported to be highest and the demand also the greatest in DP vendor firms, particularly in software and service firms.'*

> *'In the 1980s, the DP picture will remain the same . . . The demand for skilled and entry-level positions will continue to grow and the talent will remain at a deficit.'*

The industry offering the next highest salaries appeared to be banking, followed by retailing and then heavy manufacturing, according to the survey results. The lowest salary growth was in federal, state and local governments and in educational institutions.

Although salaries rose for all DP titles, some rose more significantly than others (see chart on Page 1.) Systems analysts' salaries rose 17.8%, moving them to an average salary of $26,300. Software programmers' salaries jumped 19% in the 12-month period, garnering them an average salary of $23,200.

The largest one-year jump in salaries went to 1979 computer science graduates. They started at salaries averaging $15,400 — a full 29% over salaries received by the 1978 class.

Although MIS directors received the smallest percentage gain over the one-year period, they are among the highest paid, averaging $38,100.

### Supply and Demand

The high demand-over-supply ratio for qualified DP personnel stems from continuous creation of new products for more users, according to Fox-Morris. The silicon chip, for instance, spawned generations of small computers that created more jobs than there are qualified applicants to fill.

In addition, universities are graduating too few computer science majors to fill up the personnel holes, the recruiting firm said.

In the 1980s, the DP picture will remain the same, the firm predicted. The demand for skilled and entry-level positions will continue to grow and the talent will remain at a deficit.

These conditions will result in continuing pressure to escalate salary increases beyond voluntary wage guidelines, and DPers will continue to switch from job to job to achieve the 12% to 15% annual salary hikes they expect.

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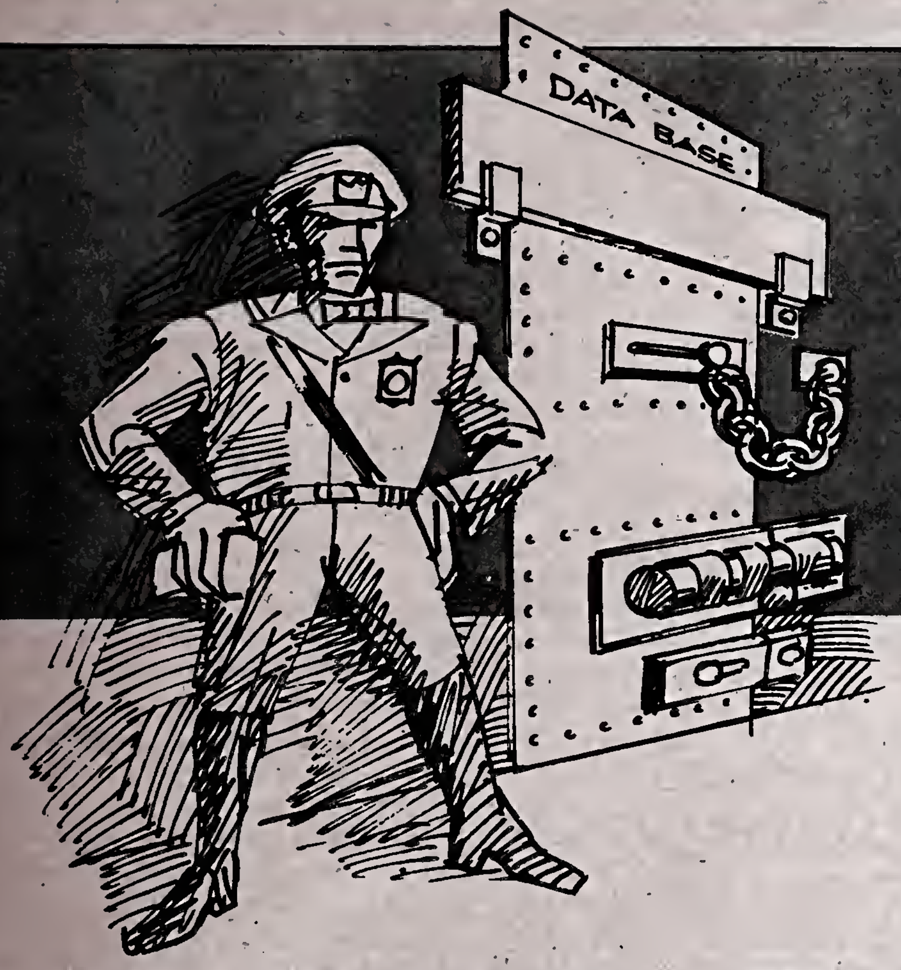

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# Settlement Could Take Two Years

**By Jake Kirchner**
CW Washington Bureau

WASHINGTON, D.C. — The prospect of a negotiated settlement of the government's antitrust case against IBM has raised Justice Department hopes of a relatively speedy finish to what seemed endless litigation.

However, even if the case does end in a Consent Decree, it could still take as much as two years, if not longer, to complete, according to an attorney in the department's Antitrust Division.

The attorney, who has worked on the government antitrust cases against both IBM and AT&T, explained that a settlement could take that long because of the lengthy process mandated by the Antitrust Penalties and Procedures Act, the applicable statute in this situation. The 1976 law, know as the Tunney Act, and Justice Department policy dictate specific precedures for a settlement with IBM.

The negotiations would be handled by the Justice trial staff, the talks with IBM lawyers being held in New York. Once the two sides came up with a mutually agreeable proposal, the terms would be reviewed by the Antitrust Division's Director of Operations and his staff.

Because of the size and importance of this case, the U.S. Attorney General would probably be consulted as well.

Exhaustive brainstorming in the Antitrust Division could then lead to further discussions with IBM to refine the agreement. When a final agreement between the two parties was reached, the proposed settlement would be put out for public comment.

"It's almost like rulemaking, with various parties submitting their views to us. Then [we'd be] required to rebut or comment on those views," the lawyer said.

The final document, including public comments and Justice Department replies, would be lodged with the court, which has final say in whether the settlement is accepted.

The attorney, who asked not to be identified, said it is too early to tell what the Justice Department will seek in terms of any restructuring or penalizing of IBM. The department may wait to see what IBM offers.

"Typically, Consent Decree or settlement initiatives originate in the minds of defendants," he said, adding that a major restructuring of IBM may not be the optimum outcome in the government's view. The department does not want to destroy the commercial viability of any company it sues for antitrust, the attorney said.

"These are baby-cutting-type exercises," he said of the settlement. "There are always disputes over whether an arm ought to be cut off or if it is sufficient to stop at the elbow.

"A small amount of relief in a technologically and commercially dynamic environment sometimes can, over time, produce miraculous procompetitive changes in the industry. On the other hand, there's always the incentive on the part of not only, I suspect, elements in the Antitrust Division, but elements of the anti-IBM parts of the computer industry to try the 'Curtis LeMay approach' bomb them back into the Stone Age."

In any case, even if the negotiations between the two parties don't break down — a big "if" — the trial teams are not about to pack up their briefcases any time soon. "It certainly is not the kind of case which is amenable to a settlement yesterday," he noted.

# IBM Persisting in Attempt to Oust Judge

*(Continued from Page 1)*

tion of the trial before a biased and prejudiced judge. The U.S. vs. IBM record is being used in proceedings against IBM in other courts, and such a record is difficult to deal with before a jury in a private case — one that might award treble damages, Barr said.

### 'Against Public Interest'

The Department of Justice's head trial lawyer, Robert J. Staal argued against a stay, contending it is in the public interest that the important antitrust case not be held up any longer than it has been already.

The three-judge panel said it couldn't grant the stay because it had no way to determine how long it might take to act on IBM's petition. If IBM is successful, continuing the trial will not cause "irreparable harm"; if IBM is unsuccessful, then the already epic trial will not be further slowed, the court said.

The appeals court judges expressed dismay at having to study IBM's exhaustive review of the transcript, which cites what the company considers Edelstein's abuses and consumes 2,300 pages, along with 500 pages from the government.

IBM's recusal petition was presented to Edelstein July 19. It charged Edelstein with "a bent of mind that will prevent impartiality of judgment." It also charged his bias and prejudice was so pervasive throughout the transcript that it must have come from an extrajudicial source, and therefore he is culpable.

### Untimely Request

In August, the government countered that the presentation of IBM's request for Edelstein's removal after four and one-half years of trial was untimely and that the bias required for recusal must be personal in nature and extrajudicial in origin. It said no such bias could be proved.

Edelstein, in his 33-page ruling of Sept. 11, said "IBM's affadavit of bias and prejudice consists entirely of judicial actions taken within the four corners of the courtroom in the course of this proceeding.

"Those judicial actions, whether ultimately upheld on appellate review or not, form no conceivable basis for IBM's present conclusion that the court possesses a bias and prejudice that 'could not have come from any source other than an extrajudicial source.' "

Edelstein said he only tries to ensure, like every judicial officer, that "the truth is discovered and the law correctly applied. IBM identifies no personal prejudice and bias on the part of this court because none exists."

The trial resumed smartly on Sept. 14 with IBM calling its 20th witness. Paul W. Knaplund was closely involved in the development of the 360 line in the mid-1960s and is now vice-president of the legal department.

# IBM Price Cuts Expected

*(Continued from Page 1)*

dack, will consist of lines of both homogeneous and heterogeneous processors; the first homogeneous processor, the Iroquois I, will be announced in early 1980, according to Fertig. Iroquois I, probably falling in the middle of the series, will have processing speeds of 11 to 12 million instructions per second (Mips).

Fertig guessed that the H series will have about twice the price/performance capability of the newly priced 30 series machines and certainly be less aggressively priced than the bombshell 4300 series. Delivery is expected to begin in 1981.

Other homogeneous processors expected in the series later in 1980 are the Catalin and Marcy. Heterogeneous processors are code-named Baldin and Sentinel, he said.

IBM's scheme will be for 30 series and H series users to co-exist, Fertig surmised. IBM will not want to announce anything that will markedly upset users which just converted to purchased machines.

IBM's problem, he observed, will be to absorb the processing capabilities of existing machines so it can continue to sell new ones. This will be increasingly difficult because of the attractive prices for used equipment.

For instance, Fertig noted, in 1982 a 3033 will be selling for 30% to 40% of IBM's original list price. Used 370/158s and 370/168s are already selling at 40% of list price.

### The 138, 148 Base

IBM also wants to prevent its 370/138 and 370/148 installed base from backsliding to the attractively priced 4300 series. Instead, IBM is advertising the 4300 for the Model 115 and 125 user; Fertig suggested it more precisely has the capability of the Model 138 or 148.

In Canada, IBM has added strictures to the 4300 so Model 138 and 148 users cannot easily move down to that machine.

By 1982, computers capable of processing 48 billion instructions per second (Bips) will exist. The question, Fertig said, is whether manufacturers will be able to develop applications to absorb all those Bips.

IBM will not be the only manufacturer pushing big machines. Fertig predicted that Amdahl Corp. has an H series-like machine in the works which will be introduced within days of the H series announcement.

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# IBM, Justice Urged to Settle 'Monster' Suit

**By Connie Winkler**
CW Staff

NEW YORK — While a federal appellate judge has urged IBM and the federal government to settle their "Frankenstein monster" antitrust case, neither side is dashing to the peace table.

Indeed, neither party had contacted the other by the middle of last week, and IBM was apparently miffed by a news story in the *Wall Street Journal* speculating on Justice Department divestiture plans for IBM.

On Sept. 14, 2nd U.S. Circuit Court of Appeals Judge William H. Mulligan urged IBM to contact Benjamin R. Civiletti, the new U.S. Attorney General, because "this is lasting longer than World War II."

The antitrust trial "has become a Frankenstein monster, and we urge that everything be done to reach some understanding," Mulligan told the parties who were in the court of appeals Sept. 14 over District Court Judge David N. Edelstein's latest decision not to recuse himself from the U.S. vs. IBM case. IBM charged Edelstein is biased and prejudiced against it and argued he should appoint another judge to hear the case, which already fills 90,000 pages of transcript.

"The only thing that has changed is a comment by a judge to Barr and Staal to talk with Civiletti," a Justice Department official in Washington said.

Thomas D. Barr, of Cravath, Swaine & Moore is IBM head counsel, and Robert J. Staal is head trial lawyer of the Antitrust Division's IBM trial team.

Barr had no comment on settlement talks, and Staal also chose not to comment because of the delicate nature of the negotiations.

### Torpedo Effort?

Last Monday, however, in a chambers conference with Edelstein, Barr called the *Wall Street Journal* discussion of a possible divestiture an "absurdity. I therefore look upon this as an effort by someone in the Justice Department to torpedo the possibility of any settlement discussions between IBM and the goivernment."

The article "raises the question whether people in the Department of Justice can be trusted to protect" IBM's business secrets, Barr said. The *Wall Street Journal* story in effect repeated the Justice Department's statement in 1972 that it wanted to split IBM into separate full-line companies.

In response to the appeal courts' urgings for settlement, Staal said, "The government is always interested in a reasonable settlement, one that achieves our objectives."

"You can't speak of achieving your objective and speak of settlement at the same time," Mulligan answered. "Somebody has got to give in some place."

On Friday, the Justice Department issued a statement of willingness to talk with IBM and said it "would seek to obtain that relief which it could reasonably be expected to achieve at trial."

In the meantime, the trial has resumed in district court — it had been adjourned while Edelstein acted on the bias petition — and Barr and Staal are negotiating the substitution of IBM Chairman Frank T. Cary's testimony in the Telex Corp., Memorex Corp. and Transamerica Computer Corp. antitrust trials against IBM for live direct testimony in this trial. Cary's pending appearance as a witness has been highly controversial because of the huge number of documents the government requested in connection with the cross-examination.

Staal has offered to narrow that document request considerably.

# Memory Viewed Dominant Factor

*(Continued from Page 1)*

future can be forecast for the consumption of power." He based his prediction of growth in memory sizes and a slow growth in the total number of logic circuits.

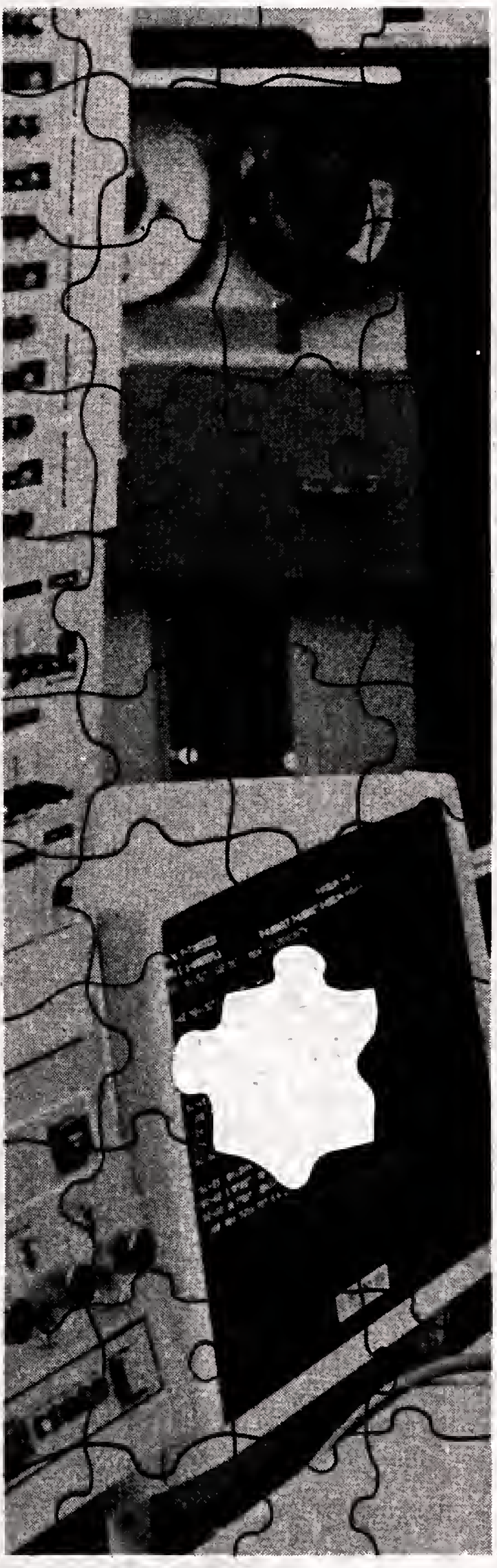
The increased power of large computers will result more from miniaturization than from integration of random-logic chips, he continued.

Difficulty in using LSI in large, fast systems "will retard the growth of levels of integration in random-logic chips" for use in large computers, Keyes forecast. The integration level will be less than "full exploitation of lithographic and processing will allow." But miniaturization of logic, decreasing energy per operation and improvements in cooling technology will produce the continuing reductions in packaged logic delays.

"Indeed, one could almost say that there is an antagonism between large, high-speed information processing systems and large-scale integration," Keyes commented.

The use of LSI in large, high-speed systems is limited by the following physical features: long wires on chips; many off-chip interconnections; and lack of power dissipation and heat removal. Another limitation stems from the lack of general points of view that would enable one to interpret statistical features of computer logic in terms of models and principles, he added.

The problem with longer wire length, which is a by-product of higher integration, is that it decreases circuit speed through capacitive loading, takes more physical space and can lead to the use of larger numbers of wiring layers on chips, Keyes observed.



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# Bell Proposes New Service, Riles Independents

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Makers of intelligent terminals are up in arms over AT&T's newest "communications processing" service. They contend it's a Trojan horse designed to sneak Ma Bell over the Federal Communications Commission's (FCC) protective wall and into the data processing equipment business.

The source of the trouble is the Magnetic Disk Storage and Retrieval Service, tariffed by the Bell Telephone Co. of Pennsylvania last June. The service utilizes a microprocessor-equipped diskette storage unit made by Sykes Datatronics, Inc. of Rochester, N.Y. The unit allegedly can do text editing plus several other chores when connected either on- or off-line to any of several standard (RS-232-compatible) I/O devices, such as CRTs or printers.

### Wants Service Stopped

The Computer and Business Equipment Manufacturers Association (Cbema) has asked the FCC to stop Pennsylvania Bell from offering the service. Under the FCC's current rules, Cbema said, AT&T operating companies cannot offer DP services.

Those rules explicitly say that "data processing" includes "the use of a computer for storing, retrieving, sorting, merging and calculating data according to programmed instructions," the association pointed out. Since the Sykes unit does all of these things and also has a built-in microprocessor, Pennsylvania Bell's new offering is unlawful "on its face," according to Cbema.

The DP capabilities of the Magnetic Disk Storage and Retrieval Service also go "well beyond" those of the Dataspeed 40/4, Cbema said, since the latter is being offered in conjunction with a communications channel while the Pennsylvania Bell service can operate on- or off-line.

Besides, Pennsylvania Bell began marketing the service at about the time the FCC issued its tentative decision in the second Computer Inquiry. This ruling, if adopted, will allow AT&T operating companies to offer DP services through subsidiaries.

Comments on the tentative decision are now being collected by the commission from interested parties. A final ruling is likely before the end of the year.

### Charges and Options

Pennsylvania Bell charges $140/mo for the service, plus $150 for equipment installation. The equipment consists of the Sykes Comm-Stor II diskette unit providing 32K bytes of storage and 60 control commands. Options include another 32K bytes of diskette storage and an expanded command set.

Software for data entry operations involving business forms is another optional extra. This feature allows formats for several business forms to be stored within the system; each can be retrieved, filled in and returned to storage automatically by an operator at a CRT which has been connected to the Comm-Stor II.

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# Justice Department Moving On Complaint Against Bell

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Department of Justice is considering a complaint from the Association of Data Processing Service Organizations (Adapso) charging AT&T with marketing software in violation of its 1956 Consent Decree [CW, Sept. 10].

Adapso's complaint is directed primarily at AT&T's marketing of Unix, an operating system developed by Bell for Digital Equipment Corp. PDP-11/10, 20, 34 and 40 processors. By selling Unix to companies that aren't communications common carriers, Adapso said, AT&T is violating Sections IV and V of the Consent Decree.

These provisions basically bar the Bell System from manufacturing and/or marketing equipment unless it's of a type used to furnish tariffed communications services.

The Justice Department has asked AT&T to respond to this complaint and to report how much it is currently earning from outside software sales. A department spokesman told *Computerworld* last week he anticipates Adapso will receive a "substantive answer" to its complaint next month.

### 'Among the Largest'

"We believe AT&T is grossing $1.6 million a year from outside software sales, even though [it doesn't] support this software and even though [it gives] it away to some users, such as universities," Adapso staff attorney Michael Nugent said. About 70% of all U.S. software vendors gross less than $1 million a year, he noted, so if AT&T is earning $1.6 million annually, it's among the largest in the commercial software business.

Adapso believes AT&T is "testing the water," Nugent added. It senses "a new regulatory climate in Washington as a result of the Federal Communications Commission's (FCC) tentative decision in the second Computer Inquiry and statements by key legislators involved in the current congressional debate on new communications legislation. Marketing software to companies that aren't communications carriers is one way of determining what the regulators will tolerate."

### Other Examples

Nugent agreed that Pennsylvania Bell's Magnetic Disk Storage and Retrieval Service (see story above) is another example of this same tactic.

Still another example may be AT&T's Electronic Information System (EIS), the on-line home and business information system being tested in Albany, N.Y. [CW, Sept. 3].

A spokesman for the Computer Business Equipment Manufacturers Association (Cbema) indicated there is growing concern within his association that EIS represents a Bell attempt to erase the FCC's boundary separating data communications and data processing. Cbema, as a result, may shortly ask the FCC to investigate EIS.

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## *Double Recognition for Davis*

# DPMA 'Man of the Year' Tapped for DOE Job

**By Tom Henkel**
CW Staff

Dr. Ruth M. Davis, the Defense Department's current Undersecretary for Research and Technology, has been named Computer Sciences Man-of-the-Year and tapped for a new job at the Department of Energy (DOE) — a double honor.

The Computer Sciences Man-of-the-Year award came from the Data Processing Management Association (DPMA), and the job of Assistant Secretary of Energy for Research Applications came in a telephone call from President Carter.

Although the DOE appointment requires Senate confirmation, Davis is quietly shopping around for a new staff while she plans her presentation to the Senate. However, she's keeping Oct. 17 open to pick up her DPMA award at the organization's annual meeting in San Diego, Calif.

### 'Less Predictable World'

Confident that she will be confirmed without a hitch, Davis says the new job is a challenge that goes beyond the factual science and technology field to a less predictable world of politics and public opinion.

"I'm not in the computer world anymore," Davis said, who for almost seven years directed the work of the National Bureau of Standards' Institute for Computer Sciences and Technology. "As one of eight DOE Assistant Secretaries, I'll be charged with moving proven technologies into industrial applications.

"I will certainly be looking for any way computer technology can assist in that. Good DPers always add to a good organization. Not only will I be looking for them, they will be volunteering.

"I don't know exactly what interaction there will be [in the DOE job] with computers," Davis continued. "I think it would be very forward of me [prior to confirmation] to say what changes I think would be purposeful, but I am indeed preparing my thoughts."

### Working with Industry

"The job in energy will require much more interaction with industry. It will also require looking at areas whose resolution is dependent on far more than science and technology," Davis said, suggesting that the economy, government regulations and public opinion would be important factors.

For Davis, finding ways to deal with private companies might be the hardest part of the DOE job.

"I never worked full-time for a private company. I've taught in universities, but only while working collaterally with government.

"Both government and the private sector should get an equal salute for the advancement of computer technology. The way industry has advanced the use of computers is a tremendous accolade to free enterprise," Davis added.

Despite numerous offers to join the private sector, Davis says she is happy working in government, and she doesn't plan to leave.

"I find that where I am now, in a policymaking role, permits me to do more good for computer science than I ever could as an individual computer scientist. Each area I've been involved with is extremely important to me, but I guess computers in national security [was most important].

> *' "I find that where I am now, in a policymaking role, permits me to do more good for computer science than I ever could as an individual computer scientist." '*

"In a sense, we have avoided wars. We haven't had a major war since computers came into place. The problems we've had since World War II have been localized conflicts among countries that aren't industrially advanced.

"We haven't had a war between two countries with good computer resources; through gaming and modeling exercises, we've been able to tell the futility of large wars," Davis said.

In issuing the Man-of-the-Year award, DPMA cited Davis' work in "national defense, human health, personal privacy, computer security, industrial productivity and international relations" as reasons for her selection.

"I don't know which of those areas did it for me. I've been a strong supporter of the humane use of computers and a strong supporter of automation and productivity. I also worked to get computer security on a sound technical and policy basis. Whether I succeeded, only time will tell," Davis observed.

As the second woman to receive the DPMA award — Grace Hopper was the first — Davis said being the DPMA "Man" of the Year doesn't bother her. "I've forgotten about the word "man" and I take it in the sense it was meant. I was very honored."

"The DPMA will present the award during its international conference Oct. 14-17 at the Town and Country Hotel in San Diego, Calif.

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# DP Costs, Aggravation Inversely Proportional

*(Continued from Page 1)*

Inc. We have software products from six firms: Computer Associates, Inc., Applied Data Research, Inc., Management Science America (MSA), DEC, IBM and SPSS, Inc.

These firms have supplied us with two independent systems and a flock of peripherals and applications.

During this period, our total budget rose by only 10% — less than the general inflation rate — while staff increased by 25%, the number of terminals by 75% and the number of computers by 100%. Obviously, there was a lot of trading-off going on here. One line item that showed an increase was the telephone; it's the most important tool we have for shopping around and locating the best prices. It's cheap — use it.

Here's how I did that trading-off. I found that Telex 277 terminals could replace our IBM 3277s at a savings of $22/mo each. Memorex's IBM 3340-equivalent disk drives cost $100/mo less than IBM's.

Some DEC gear, some terminals and a Radio Shack acoustic coupler, swapped for three IBM 2741s, a keypunch and a software package, provided sophisticated computing facilities for academic users and eliminated some migraine headaches for everyone. In this case, we reduced our aggravation at the cost of an increase in expenditures.

Of course, I negotiated with all the vendors down to absolute rock bottom. This takes a lot of practice, but the skill can be used in other places. I learned it years ago when I frequented a scroungy little shop that sold junk, which it referred to as "antiques." Over a period of time, I determined that I could usually knock about 40% off the original price through persistence.

One day, I saw a beautiful writing desk that cried out to me, "Buy me, buy me." It was priced at $195. I bargained; the dealer was resolute. But that day I wrote out a check for $125 and placed it in my wallet.

After that, I stopped to negotiate once a week. Little by little the price dropped. After six months, the price was wehre I wanted it; I whipped out the check, and the desk seemed to sigh, "Thank you." Persistence pays.

The point is, you have to use every trick in the book if you're going to bargain. Promise future orders in exchange for quantity discounts. Offer publicity — good if the price is right, bad if it's not.

If you're an educational institution, ask for discounts; you can get 10% to 50% off the list price on that basis.

### Saving on Supplies

Another good place to save money is on supplies. Look for bargains on ribbons, paper, labels and tapes. Check with other DP shops in your area and combine your orders. The bigger the order, the smaller the unit price, usually.

Ask your neighbors about giveaways, too. One of the big shops in our area gave us several cartons of used magnetic tapes that were no good to it but have proven to be perfectly serviceable to us.

But watch out for off-brand products. Some are good, some are not. Always insist on a free trial; don't pay for your order until you have used a sample and verified that it is at least as good as what you've been using.

We once got a good price on labels. I later found the operations manager on hands and knees, behind the printer, poking each sheet with his fingers to make it fold and cursing me with every poke.

After that, I put him in charge of purchasing supplies.

### People Cost Less

Another point: Don't overlook the fact that in batch operations, you can often trade real time for faster hardware. Add another shift. Add two. People are still cheaper than hardware and usually better.

For some of these tasks, you can check with your local high schools or vocational schools. There are many bright young graduates with some usable training coming out of these places.

Best of all, these people are often green, and you can take advantage of this by training them to your operations right from the start.

Another trade-off you can occasionally make is software for hardware. We bought a disk file management program that gave us back 25% of our disk space and allowed us to put off installation of additional drives for more than a year. There are a lot of these around, and we have found they are certainly worth the investment.

Depending on the type of activity you support, programs that help you optimize your job mix could be used to allocate resources more effectively and thereby forestall the addition of memory or other hardware.

Most of these products have a free trial period — but you should be sure you've done your homework before starting the trial. You might have to spend as much as a half-day reorganizing your procedures in order to test the package, and even then you may not be able to do it and still maintain your production capacity.

*Johnston is director of the computer center of Western Maryland College in Westminster.*

# SRI Plans Briefings For Top Management

CHESTNUT HILL, Mass. — A two-day executive management briefing on DP systems, security, auditability and control will be offered by SRI International, Inc.

Designed to provide managers of both auditing and information systems with information about the latest tools, techniques and technology, the seminars will be offered at eight sites between October and December.

The first limited-attendance briefing will be held on Oct. 15-16 at the Hyatt on Union Square in San Francisco. The program will be repeated Oct. 24-25 at the Gotham Hotel in New York; Oct. 30-31 at the Water Tower Hyatt in Chicago; Nov. 7-8 at the Hyatt House in Los Angeles; Nov. 13-14 at the Colony Square in Atlanta; Nov. 27-28 at the Sheraton Centre in Toronto; Dec. 5-6 at the St. Regis-Sheraton in New York; and Dec. 13-14 at the Hyatt on Union Square in San Francisco.

More information is available from Kay Hardy, Center for Management Research (briefing coordinators), 850 Boylston St., Chestnut Hill, Mass. 02167.

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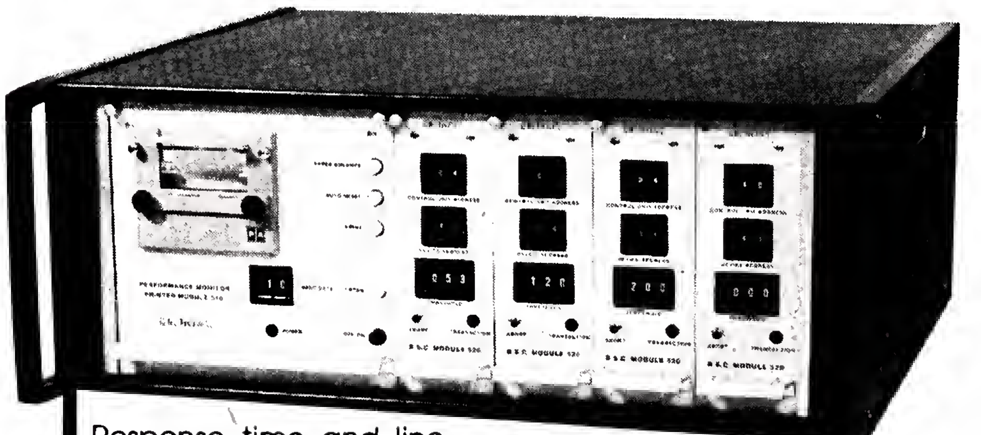

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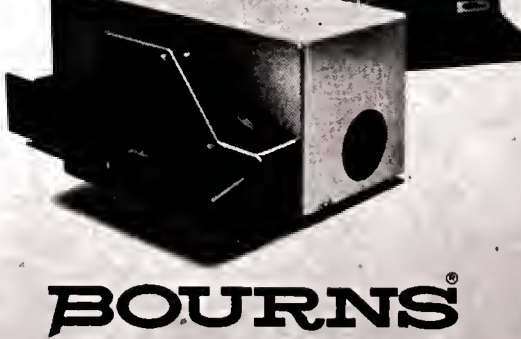

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## *Among Them: Intersatellite Links*

# Technological Expectations for Intelsat Detailed

**By Molly Upton**
Special to CW

SAN FRANCISCO — Technologies that will appear in the fifth generation or later of International Satellite Organization (Intelsat) satellites will include intersatellite links (ISL), multiple-beam antennae and satellite switched time-division multiple access (SSTDMA), according to a paper by V.M. Ahern and E.M. Greenberg of the National Telecommunications and Information Administration that was presented here at Wescon/79 last week.

CW at Wescon/79

ISLS will reduce the number of earth stations needed to be built to accommodate system expansion. However, ISL technology is still in the development stage and probably won't be available until 1985 at the earliest, they observed at the session on satellite systems for the next decade.

The highly isolated multiple antennae could become one of the most fruitful techniques for increasing spacecraft capacity by permitting the reuse of the 6/4 GHz and 14/11 GHz frequency bands, approximately doubling the capacity of the individual spacecraft, according to Ahern and Greenberg.

The use of this technology on an Intelsat system, however, is unlikely before 1985 or 1986.

Another means of increasing the capacity of the spacecraft could be SSTDMA, which could be used along with ISL. Again however, the earliest implementation would be in 1985 or later.

But another technology that will increase capacity — time division multiple access-digital speech interpolation (TDMA-DSI), — has been tested with existing equipment. Intelsat should make a decision on its implementation by the end of this year, they said.

Richard L. Granger and N.K.M. Chitre of Intelsat explained that the current generation of Intelsat IV satellites have an FDM/FM telephony capacity of about 13,000 channels but the next generation, the Intelsat V scheduled for launch early next year, will have 25,000 channels. The increased capacity will be achieved by a fourfold frequency reuse within the 6/4 GHz band and twofold reuse within the 14/11 GHz band.

The advent of the Space Shuttle, with its increased payload, will facilitate the launching of more advanced Intelsat V satellites with capacities 40% to 60% above the initially launched Intelsat V. These units will incorporate a sixfold reuse of some frequencies.

Sometime between 1985 and 1987 will come the Intelsat VI, which will rely in part upon SSTDMA but also have a substantial FDM/FM capacity in order to permit orderly evolution of the Intelsat system from the FDM/-FM environment to a predominately TDMA environment by the late 1980s or early 1990s.

Although there may seem to be abundant capacity in the skies, Intelsat is facing a fundamental policy question, Ahern and Greenberg stated. Intelsat has been granting domestic leases of its spare transponder capacities that are intended for backup. Thus far Intelsat has approved domestic demands that by 1983 would occupy more than two-thirds of the capacity of spare Atlantic and Indian Ocean region satellites.

## *Comsat to Sell Capacity Direct to Users*

SAN FRANCISCO — Users will be able to buy satellite capacity directly from Communications Satellite Corp. (Comsat) when the next generation of maritime satellites, Inmarsat, replaces the Marisat satellites beginning in 1981.

This is in contrast to the current arrangement Comsat has with most International Satellite Organization (Intelsat) services wherein Comsat leases capacity to AT&T and the record carriers, who in turn sell service to the ultimate consumer, according to V.M. Ahern and E.M. Greenberg of the National Telecommunications and Information Administration.

Speaking at a Wescon/79 session on satellite systems for the next decade, Ahern and Greenberg said Comsat acquired this right through the enactment in 1978 of the International Maritime Telecommunications Satellite Act. This act authorized Comsat to be the sole provider of the space segment and the operator of the U.S. Inmarsat earth stations. Other carriers may own up to 50% of an earth station.

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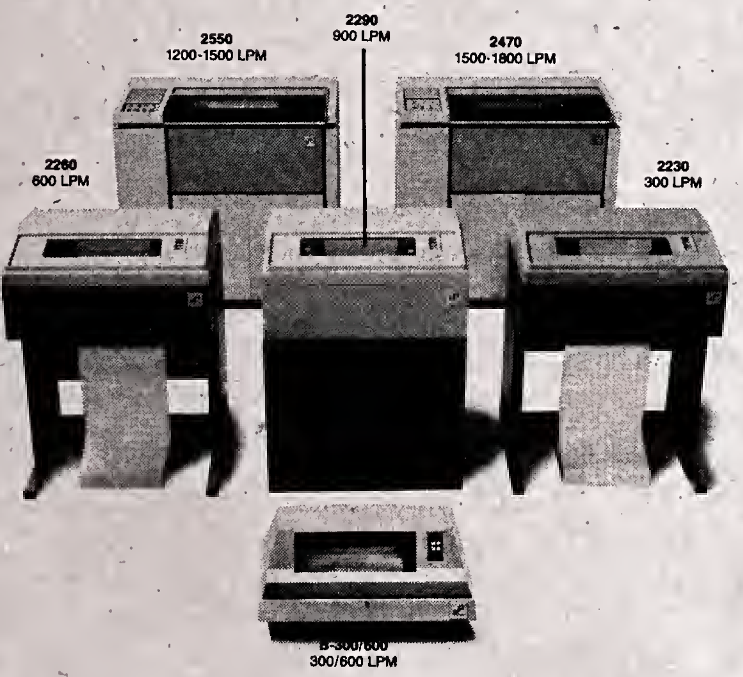

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# Six-Step Method Urged to Tighten Security

**By Jeffry Beeler**
CW West Coast Bureau

SAN FRANCISCO — Most users have fared "very poorly" in their attempts to safegurad their systems' security, according to Peter S. Browne of the Rockville, Md.-based Computer Resource Controls Corp.

Speaking at a session of last week's Wescon/79 conference here, Browne urged users to fortify their DP security measures by adopting a systematic troubleshooting technique known as "computer system risk management." Without such a formal method of protecting system integrity, Browne explained, DPers run the risk of overlooking serious security threats that could lead someday to hardware damage, date or software loss, processing delays and other computing room calamities.

CW at Wescon/79

Based on his own and others' research, Browne has concluded that many users remain wide open to security breaches even after they equip their systems with extensive safeguards. To illustrate his point, he cited the example of the U.S. Social Security Administration's $500,000 security system, which was broached when two auditors used a screwdriver to unhinge a door and then swiped two carts of magnetic tape.

Users can avoid many such costly losses, however, simply by increasing their reliance on risk management techniques, Browne said.

In essence, risk management is a systematic means of calculating the amount of damage a user would sustain from a specified security threat. The procedure tells users what types of risks pose the greatest hazards to their installations, estimates the probability that those mishaps will occur and allows DPers to institute safeguards aimed at aborting potential security problems.

A risk management method developed by Computer Resource Controls and others consists of six steps, Browne said: project initiation, assets analysis, applications analysis, threat and vulnerability analysis, loss exposure analysis and controls analysis.

In the first step, project initiation, a user and its outside consultants coordinate their resources and gather the raw data upon which the other five risk management steps will depend.

In the second step, assets analysis, the risk management team specifies the DP resources a user wants to protect and quantifies the value of each. From this information, a DPer can estimate the time and money it would need to replace computing assets damaged or ruined by threats like natural disasters, accidents or intentional destruction, Browne said.

After completing its assets analysis, a user would then perform an applications analysis to assess the effect of data disclosure, modification or destruction on its DP operations. In conducting an applications analysis, the user would also examine the probable impact of processing delay and data errors, estimate the cost of recovering lost data and assess the potential for fraud and embezzlement.

Next in a typical risk management procedure comes the threat and vulnerability analysis, in which a user first enumerates the types of hazards facing its installation and then calculates the chances of their taking place. Some of the most typical threats to DP sites include fire, sabotage, electrical transients, storms, bombings, floods and earthquakes.

To estimate the probabilities that any of those events will occur, risk management practitioners rely on past experience and their knowledge of local factors that might affect a DP site's operations. They also evaluate a computing center's audit programs as well as the effectiveness of the physical, administrative and technical security precautions it has already installed.

The fifth risk management step, loss exposure analysis, tells a user how much damage it can expect to incur each year from a given type of security threat. DPers can obtain that figure simply by multiplying the estimated dollar loss per incident by the frequency with which the threat is expected to strike. For example, if a fire is predicted to occur every 50 years and cause an estimated $1 million in damage per outbreak, the annual loss exposure would be $1 million multiplied by .02, or $20,000, Browne explained.

In the sixth and last risk management step, controls analysis, a user recommends cost-effective security precautions aimed at preventing what the previous five steps identified as high-risk threats. To minimize the danger of fire, for example, a DPer might suggest enhanced smoke detection equipment coupled with an automatic sprinkler system.

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## *Though Transition May Be Slow*

# Users Told Packets Ideal for Voice Transmission

By Molly Upton

Special to CW

SAN FRANCISCO — Although the transition of voice transmission to packet switching may occur more slowly than it did for data transmission, "there is no way to stop it from happening. Packet switching seems ideally suited to both," Larry Roberts, president of Telenet Communications Corp., told a Wescon/79 session here last week.

Among the changes Roberts sees coming are faster trunk speed — and correspondingly lower cost and broader applications — and, eventually, the use of broadcast satellites by public data networks. In addition, packet technology may well be incorporated into radio transmissions, Roberts said.

There are basically two kinds of schemes for transmission, preallocation and dynamic allocation. Circuit switching and other types use preallocated bandwidth, whereas in packet switching, "a network only allocates bandwidth when a block of data is ready to be sent and [allocates] only enough for that one block to travel over one network link at a time."

One reason data and not voice transmission was the first to embrace packet switching is that the advantages were more clear-cut. Digitized voice can be compressed by a factor of three or more by packet switching, whereas interactive data traffic typically can be compressed by a factor of 15.

"However, modern electronics is quickly eliminating any cost difference between packet switching and circuit switches, and thus packet switching can clearly provide a factor of three in cost reduction of transmission costs associated with switched voice service.'"

The flow control feature of packet-switching networks can provide a substantial cost reduction for voice systems, because peak channel capacity required by users can be significantly reduced, he explained.

The reason the transition of voice to packet may be slower is the huge user investment in voice equipment.

Explaining the transition of data transmission to packet switching, Roberts noted, "Depending on the nature of the data traffic being transferred, the packet-switching approach is three to 100 times more efficient than preallocation techniques in reducing the waste of available transmission bandwidth resources."

With the advent of cheap computing power, packet-switching systems have become more prevalent. "If lines are cheap, use circuit switching; if computing is cheap, use packet switching," Roberts said. The packet-switching system requires both processing power and buffer storage devices at each switch in the network for each packet sent.

CW at Wescon/79

As packet switching becomes more popular and microprocessors are used to provide protocol conversion from X.25 to any existing terminal protocol, the need arises for a faster backbone trunk speed — from 56K bit/sec to 1.544M bit/sec. With this anticipated change to the higher speed TI digital trunks, "many aspects of network design will change by a corresponding order of magnitude."

For instance, the current delay in the 100-200 msec range has strongly influenced the system design and choice of applications. But with the TI trunks, transit delay in the net will drop to around 10 msec, plus propagation time. This will require a "complete reexamination of network topology and processor design issues," he said.

The number of outstanding packets on a 2,500-mile trunk will increase from about three to 75, thus requiring "extended numbering and possibly new acknowledgement techniques."

A significant price decrease will accompany this change, which, with the short delay, will make many new applications attractive, Roberts added.

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# *Creating the Perfect Candidate*

By Marguerite Zientara
CW Staff

NORMAL, Ill. — In a slight twist on aiming a political campaign at the right voters, computers have been used to "create" a political candidate most likely to appeal to the existing electorate.

The creation of a phantom candidate was originally undertaken as a "satire" by two communications professors who developed a computerized speech-writing method to produce political oratory that — literally — can "play in Peoria" [CW, March 21, 1977].

Believing that election to public office has become more a matter of manipulating symbols than dealing with substantive issues, John Cragan of Illinois State University here and Donald Shields of the University of Missouri at St. Louis programmed an IBM 370/145 to write the "perfect" foreign policy speech.

The speech was judged on its ability to appeal to the most and offend the fewest in any given audience, Cragan explained.

While the two "speech writers" first touted their political speech idea two years ago, they intend to have just a little more fun with it during the 1980 election campaigns.

Next spring, the pair will use the system to write a political and an energy speech, which they will then submit to the press for a qualitative comparison with the real candidates' speeches.

"As long as people are writing speeches trying to appeal to what the majority of the people want to hear," Cragan observed, "I'm convinced our machine will win."

While the two cynics hope their computerized speech-writing will ultimately have some positive effect on politics' present methods of writing oratory, their message could backfire.

"For all I know, some candidates may well be doing that [writing speeches with computers] already, or very close to it," Cragan said. "They're employing high-powered marketing firms that develop the advertising for consumer products such as Virginia Slims for 'liberated women' or 7-Up for members of the counter-culture."

### Three World Views

The professors' underlying theory is that to get elected, a politician need only recognize that voters generally hold one of three "dramatic" views of the world and then play to the most widespread view.

According to Cragan and Shields, the foreign policy views can be described as cold-war, neoisolationist and power-politics attitudes.

Regarding the Panama Canal issue, the cold-war view held that the U.S. ought to keep the Canal Zone, while the neoisolationist point of view called for the U.S. to get out of Panama. The power-politics attitude supported the negotiation of a new treaty to protect U.S. interests in the zone.

### Perfect Speech

In order to program the computer to write the perfect speech, the professors first searched periodicals for months, jotting down quotations on 20 foreign policy issues that reflected all three world views.

The pair then asked 60 Peorians to indicate which of the statements most reflected and least reflected their own views. The ranked statements were keypunched onto cards which were processed by the system at Illinois State.

Using factor analysis and linear equation programs written by the two political observers, the system spewed out a short speech describing the hypothetical candidate's opinion on how best to handle U.S. foreign policy — that is, for the ears of Peorians.

"First of all," the speech began, "let me say that the United States is not a failure. I recognize that it's foolhardy to unilaterally disarm, but . . ."

While the computer's speeches are characteristically bland, according to the professors, the 1977 version received an ovation when it was presented before a Peoria audience. According to Cragan, "The point is that you can take any idiot, parade him around the country for 12 months and get him elected."

While the computerized speech-writing method was satirical, the technique itself is now used by the two colleagues for the practical applications of market research for new products and for writing advertising copy, according to Cragan.

To improve the method, they now sample 400 to 500 opinions as opposed to 60.

In addition, they can give a "much richer description" of those surveyed in terms of demographics and psychographics, Cragan said. "Now in our Peoria study we can tell you whether he was an East Peorian or whether he lived downtown; if he was a World War II veteran or college graduate," he noted.

Therefore, instead of merely "playing in Peoria," a speech can now be written to play in North, South, East or West Peoria.

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# Technique Locates Candidates' Potential Backers

**By Marguerite Zientara**
CW Staff

WASHINGTON, D.C. — A number of 1980 political candidates are expected to make use of a computer-based technique that can indicate exactly where a candidate's potential supporters live within a certain area.

By assimilating Census Bureau statistics and mass mailing lists, computers can quickly produce the names and addresses of the citizens most likely to vote in a particular way. This automated method contrasts with traditional techniques such as obtaining interest group membership lists and "working the Irish wards," as campaigners have done for more than 100 years.

While manual techniques can help determine which voters might be responsive to a particular candidate or issue, the automated method of analyzing the opinions of potential voters allows a candidate to aim his campaign messages more precisely at the 20% to 30% of the population most likely to be affected by them.

The technique ensures a wise use of campaign funds and eliminates efforts to reach 100% of the population, according to Paul Lutzger, vice-president for politics and public affairs at Hamilton & Staff, the political consulting and polling firm here that developed the automated method.

While the technique was tested successfully in an issue-oriented campaign, only one candidate for office — Louisiana gubernatorial hopeful Louis Lambert — has made use of the Hamilton & Staff technique until now. The results of that election will not be known until the end of next month. Nevertheless, several political candidates are expected to make use of the technique in the 1980 elections, Lutzker said.

"The real question is this: How many of the people who are up [for election] in '80 will become aware of the possibilities and decide to use them," Lutzker said.

The technique was tested in 1978 in Missouri, where a right-to-work amendment to the state constitution was defeated by a 60% majority in a surprise upset. A poll commissioned by labor leaders early in the year had shown the proposition was favored by 63% of the Missouri population.

### Manipulating Census Data

The method behind this "manipulation of large data bases," as Lutzker called it, begins with Census Bureau data furnished by Claritas Corp. of Rosslyn, Va., a firm specializing in demographic research for commercial mailing. The census data breaks down its canvassing areas into 280-family block groups and indicates statistical information without identifying specific names or addresses.

In the Missouri case, a Hamilton poll — with a larger-than-normal sample for accuracy in determining attitudes among relatively small groups of voters — was used to determine which of 40 classifications of Missouri residents appeared favorable to the cause of defeating the amendment. The 40 classifications, developed by Claritas, described "vividly distinct" neighborhood or community types, taking into account combinations of economic, ethnic, educational and geographic characteristics, according to Claritas President Sam Barton.

The classifications were fed into the system — Hamilton & Staff used three Washington area service bureaus — along with census data pinpointing the 40 characteristics for all 6,000 block groups in Missouri and the names, addresses and telephone numbers for corresponding block groups, obtained from mass mailing lists.

Out of the system came a list, in order of political potential, of those block groups that seemed worth exploring, along with a list of the names, addresses and telephone numbers of the people in those groups, derived from the most reliable current information.

That list formed the basis for an intensive mail, telephone and personal contact campaign in which those voters were urged to register and then to vote. Administered by another Washington political consultant, Matthew A. Reese, the get-out-the-vote campaign was the last step in the total method.

"We can't measure, of course, how many other factors affected the outcome of the vote on the proposition," William Hamilton said, "but we naturally like to think that we played a substantial role in its defeat. The figures are on our side."

Those involved believe much of the method's success came from having put the pressure on potential converts only. The consultants decided early in the campaign not to try to arouse the entire Missouri electorate; their polls showed that method might turn out as many votes for the amendment as against it.

As a result, only about 15% of a $2.2 million budget was spent on television.

While the Missouri issue-oriented situation was a "relatively simple model of how attitudes and behavior interact," according to Lutzker, a candidate-oriented campaign entails devising a "slightly more complex model" that must take into consideration such things as party loyalty, attitudes toward issues and attitudes toward candidates and their personal traits. "The object is to put all that data together in such a way as to [be able to] profile the voters who are most persuadable in the election."

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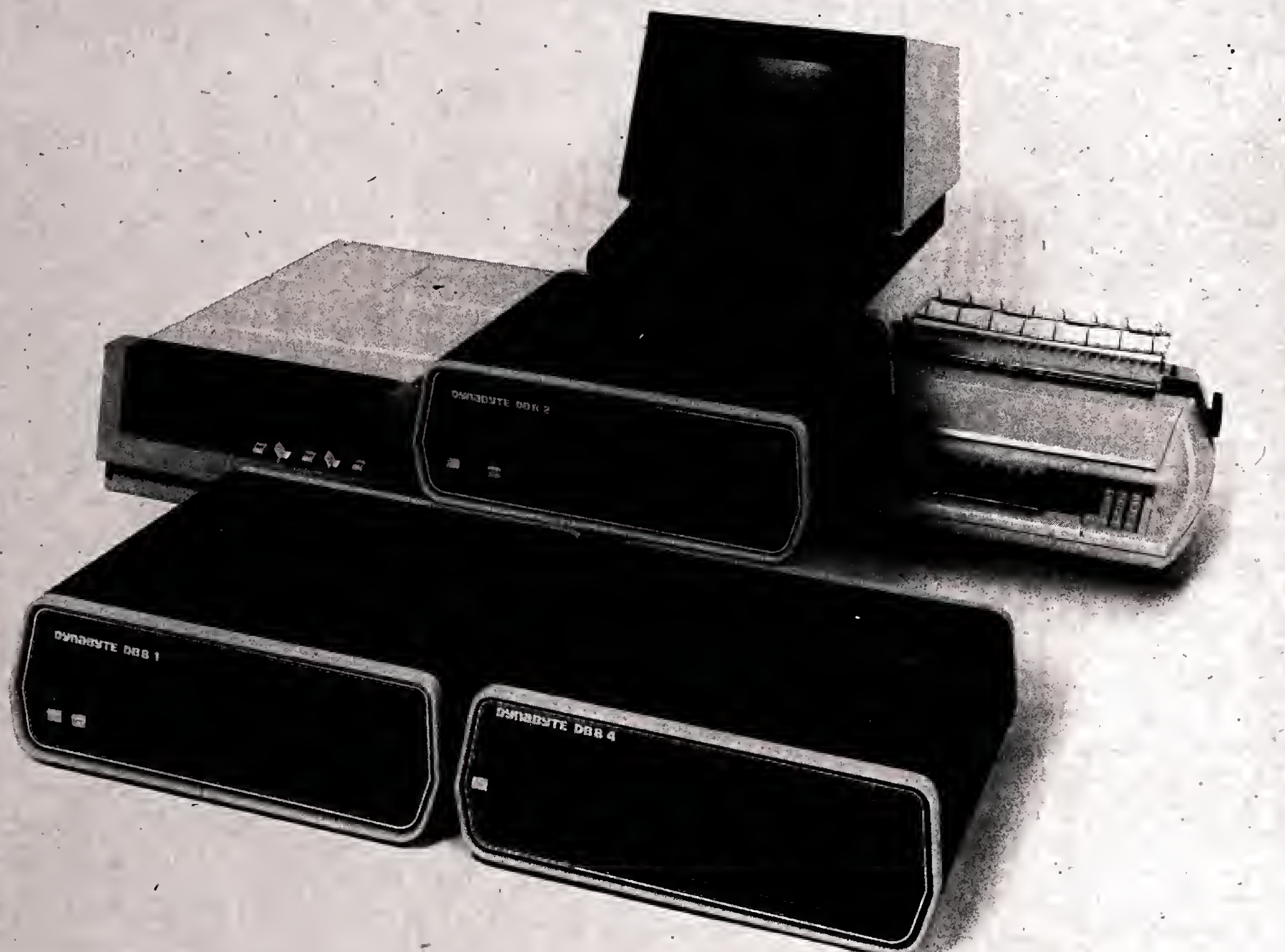

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### *$36 Million Damages in 1978*

# California Net Would Douse Arson

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES — Efforts to combat a growing arson epidemic could soon receive a much-needed boost from a proposed computer network that would embrace every fire department in Los Angeles County.

Most of the $225,000 needed to develop the system would come from the federal government, to which local fire fighters have already applied for a grant. Although area officials probably won't know until mid-October whether their application has been accepted, the prospects for approval look "very good," according to Capt. Thomas McGinnis, head of the city fire department's arson unit.

"We really did our homework before we submitted our proposal to the federal Law Enforcement Assistance Administration, the agency that would be funding the system," McGinnis said. "Furthermore, we've gotten unbelievable support for the project from almost every community in the county."

If installed, the network would serve all 81 of the county's fire departments when it becomes operational early next year. The heart of the network would be a mainframe housed in the city's Data Services Bureau, but because the federal government still must formally bless the project, local fire fighters have yet to make a final CPU selection or even to begin evaluating competing models.

The system's other major hardware modules would include eight on-line CRT terminals, which would operate at remote sites throughout the county.

## Shared Access

With these as yet unselected terminals, any of the county's participating fire departments could gain access to the system's central data base and retrieve a needed file within a few minutes or even seconds, McGinnis explained.

Much of the system's data base would be devoted to arsonist profiles and would stress information like suspects' names and descriptions of their usual modes of operation. The system would also store key facts about the arsonists' targets, including the buildings' addresses, owners, descriptive details and occupancy rates.

"It will be a very basic system, nothing very complicated about it, but the information in it will be invaluable during the course of an investigation," McGinnis said.

The network's main asset, he added, will be the ease with which it would allow the county's fire departments to share information about suspicious fires.

## Seeking Patterns

To date, such sharing has proven difficult if not impossible because of the ineffectiveness with which most of the county's communities maintain their arson files. Many local fire departments keep no systematic arson histories at all; of those that do, most imitate the clumsy manual system developed by officials here, McGinnis said.

That system hinges on a box of 55,000 index cards with which the city's fire department maintains a permanent record of every arson case known to have taken place within its jurisdiction.

In investigating a suspicious fire, the department first manually checks its own card file to see if it has any previous record of similar blazes. It then performs an identical search of other communities' card files.

If the cross-checks show that different communities are experiencing similar kinds of questionable fires, investigators suspect the blazes were set by the same individual. By then checking the fires' characteristics against the modus operandi of known arsonists, investigators can often produce the name of a prime suspect.

Thus, the discovery of patterns in suspicious fires is usually the first big clue that leads eventually to an arson arrest, McGinnis explained.

## Antiquated System

In theory, the purpose of a card file system is to assist arson investigators by easing the exchange of fire information among neighboring cities. In practice, however, the system often produces just the opposite effect.

"It's the most antiquated procedure you've ever seen," McGinnis complained. "All our investigations are done manually or over the phone, and it often takes a week to get the information you're looking for — if you can find it at all."

## Two Weeks or Two Minutes

McGinnis cited the recent example of an area arsonist who did $4 million worth of damage by starting blazes inside supermarkets."It took one of my investigators nearly two weeks and more than 40 phone calls to try to trace the rumor that someone elsewhere in the county had information about an arsonist who met our suspect's description."

With a computer network, the same information would have taken only about two minutes to retrieve, he noted.

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# Post Office Finalizes Ruling On Batch Material Fees

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A final rule on whether DP materials for batch processing and software programs delivered by private carriers are first class mail and thus subject to postage fees has been adopted by the U.S. Postal Service.

The Postal Service essentially reaffirmed existing regulations, ruling that DP materials are not letters if they are produced on "a recurring basis" and delivered to a DP center within 12 hours after they are produced.

This does not cover materials sent from a DP center if they were not processed specifically for and according to the directions of the recipient. "Clerical work preparatory and incidental to the entry of data" will not affect the ruling, the Postal Service said.

At the same time, the Postal Service ruled that "inasmuch as 'programs' are separate from the information which is entered into computers for 'processing,' " they should not be treated as letters.

### Not Sufficient

Commenting on the batch materials ruling, Jerome L. Dreyfer, executive vice-president of the Association of Data Processing Service Organizations, said that "the exemption [the Postal Service has] given us . . . is not sufficient in many instances."

Many batch processing firms send materials by bus or other private carriers, which makes the 12-hour carriage limit too short to be of benefit. "We were trying to get that [time limit] waived — period," he said. "We never really did find out why they [the Postal Service] feel so obstinate about their decision on that."

Discussing the reasoning behind its ruling, the Postal Service observed that some in the DP industry feel "Data Processing materials should not be considered letters at all. This suggestion ignores the fact that materials sent to data processing centers contain information recorded in or on tangible objects.

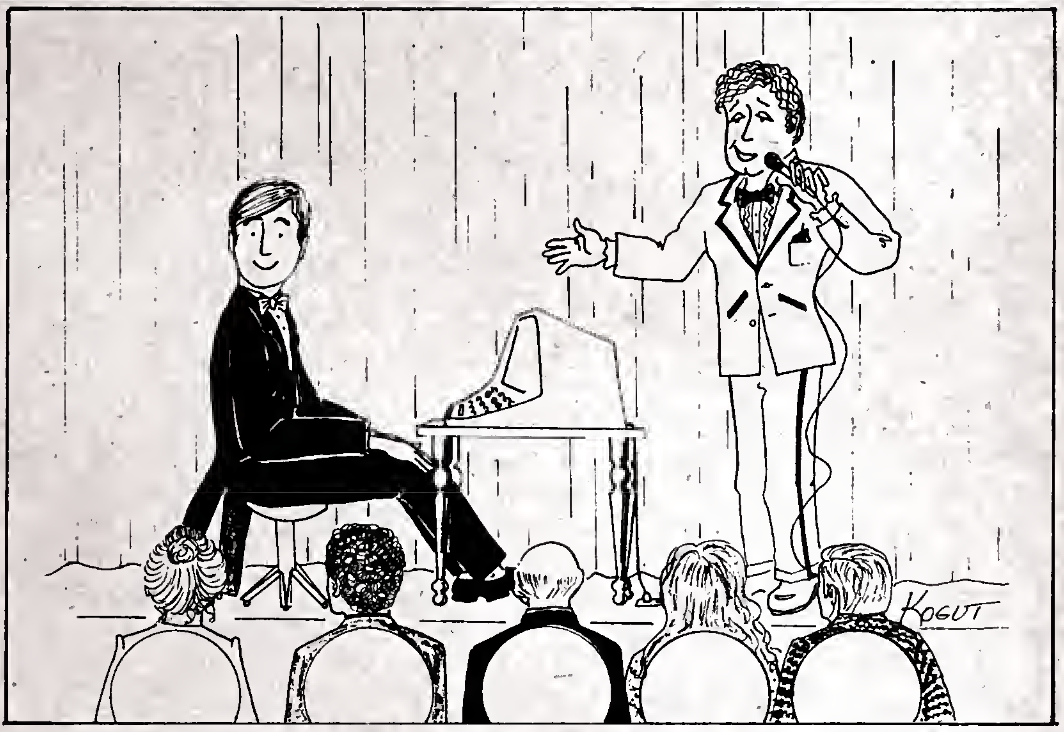
"Accordingly," the agency said, "materials sent to the centers are letters as defined in . . . the Postal Service's regulations."

The limited suspension of the Private Express Statutes — the law that preserves first class mail as a Postal Service monopoly — for batch materials is meant to "facilitate the rapid commencement of data processing," the Postal Service explained.

In issuing this final rule, the post office said it is presently concerned only with changes to the statutes that are not controversial or that constitute only "minor changes."

The ruling does not, for instance, address the question of whether the Postal Service will monopolize the transmission of electronic messages, as feared by some in the telecommunications industry. That question is tied up with present Federal Communication inquiries and proposed congressional legislation [CW, April 12].

Telecommunications industry sources here speculated that the Postal Service will not proceed with a Private Express Statute ruling on electronic mail until the legal and regulatory issues and the issue of the Postal Service's own involvement in electronic mail are settled.



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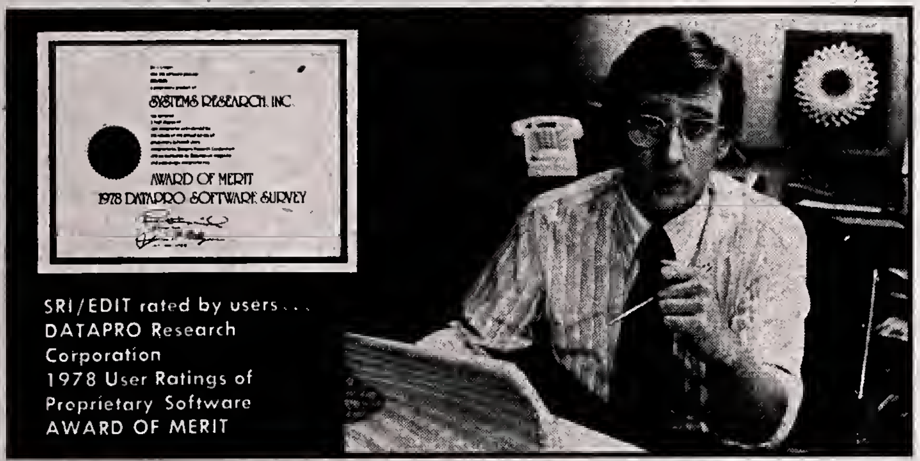

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# House Gives DOD More Control Over DP Exports to Communists

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The House of Representatives has voted to give the Department of Defense (DOD) greater control over sales of computers and other high-technology items to communist countries.

The Sept. 11 action came in a vote on an amendment offered by Rep. Richard Ichord (D-Mo.) to the Export Administration Act.

The House turned down a second Ichord proposal to prevent the Commerce Department from removing items from the export control list when their sale no longer threatens U.S. security.

The Export Administration Act is designed to overhaul the presently cumbersome export approval process, which some members of the DP industry claim costs as much as $1 billion annually in lost overseas sales.

Calling the export control program "a total shambles," Ichord said his amendment for DOD control of the program was based on findings of the 1976 Defense Science Board, chaired by J. Fred Bucy, president of Texas Instruments, Inc. The board recommended the government institute a "critical military technology approach" to considering export applications.

That approach, already under development by DOD and scheduled for implementation by October 1980, seeks to control the export of technologies, rather than products, that would permit a major advance in a weapons system of an adversary country.

Adding incentive to congressional action in this area was the recent revelation that the Soviet's Kama River truck factory, a turnkey facility complete with an IBM system purchased from the U.S., has been used by the Soviets to manufacture military vehicles.

Testimony on the Kama factory and foreign sales of advanced technology "reveals a frightening story of an almost unchecked flow of technology out of this country to other countries," according to Rep. James Courter (R-N.J.).

"This includes computer and microcomputer technology, microcircuitry, electronic technology, optical and laser technology that goes into Soviet hands.

### Naive Assumption

Backers of the Ichord amendments pointed to the 1976 proposal by Control Data Corp. to sell a Cyber 76 system to the Soviet Union for international meteorological analysis. That sale was vetoed by the White House.

"It is incredibly naive, but some members of the business and political communities would have us believe that the Cyber 76 or a comparable computer would be used by the Soviets for purely peaceful, domestic purposes" Rep. Robert Dornan (R-Calif.) argued.

However, Rep. Bill Renzel (R-Minn.), who noted the Cyber 76 is manufactured in his congressional district, pointed out that "this was a 20-year-old piece of technology."

The Ichord proposal to give DOD more say in export control passed on a 273-145 vote over the protests of several congressmen who argued the export control list should be administered jointly by DOD and the Commerce Department.

A 206-201 vote retained the portion of the legislation directing the Secretary of Commerce to oversee the "indexing" of the commodity control list. Indexing refers to the progress of removing items considered "obsolete with respect to the national security of the United States."

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# Turnkey Was a Turkey, But It Was Too Late

NEW YORK — Sometimes being too patient for too long means tough luck.

An insurance underwriter here was plunking along with its third-generation mainframe when it realized it was running out of storage capacity, according to the "Computer Law and Tax Report." Enter Mainframer A, which convinced the underwriter its mainframe would solve all its problems. An offer was made, the underwriter liked it and the system was installed in January 1971.

However, the underwriter didn't live happily ever after. Soon after the new mainframe was installed, the underwriter noticed a few problems. Invoices came out wrong, as did production reports, payment records and cash receipts.

A bit miffed, the underwriter asked the mainframer to fix the problems. The mainframer tried for almost two years and failed. Sometime in 1972, the mainframer decided to pack it in and "departed, never to return," the underwriter charged.

By 1975 the underwriter was more miffed than ever. Claiming its turnkey system was a turkey, it sued the mainframer. Charges of misrepresentation and fraudulent inducement, three counts of breach of contract and warranty, four counts of negligence of a charge of "computer malpractice" were levied against the mainframer.

A New York district court judge ruled the underwriter waited too long — the four-year statute of limitations had expired.

Claiming it waited two of the four years trying to get the system's glitches ironed out, the underwriter appealed. An appellate court judge also threw the case out, saying the time spent waiting for the mainframer to come didn't count in extending the statute of limitations. Similar rulings were handed down on the other claims.

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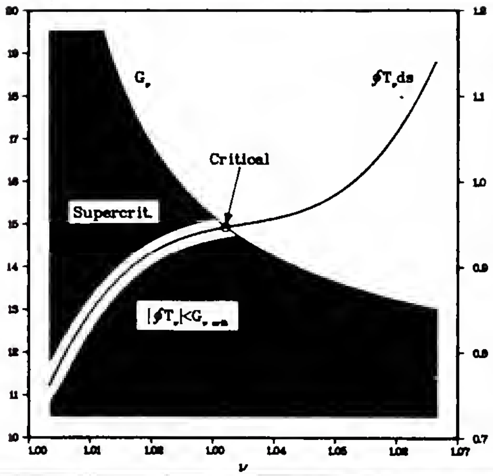

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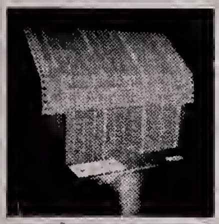

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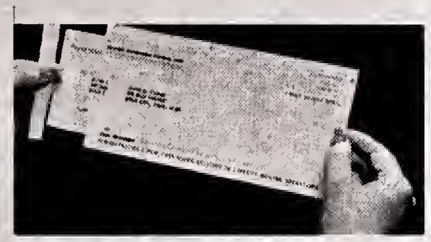

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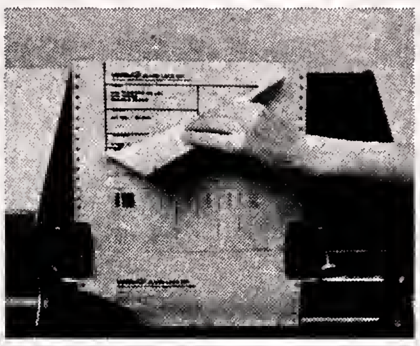

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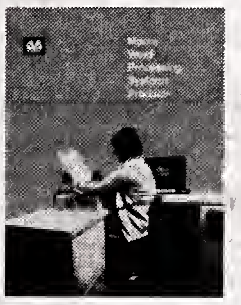

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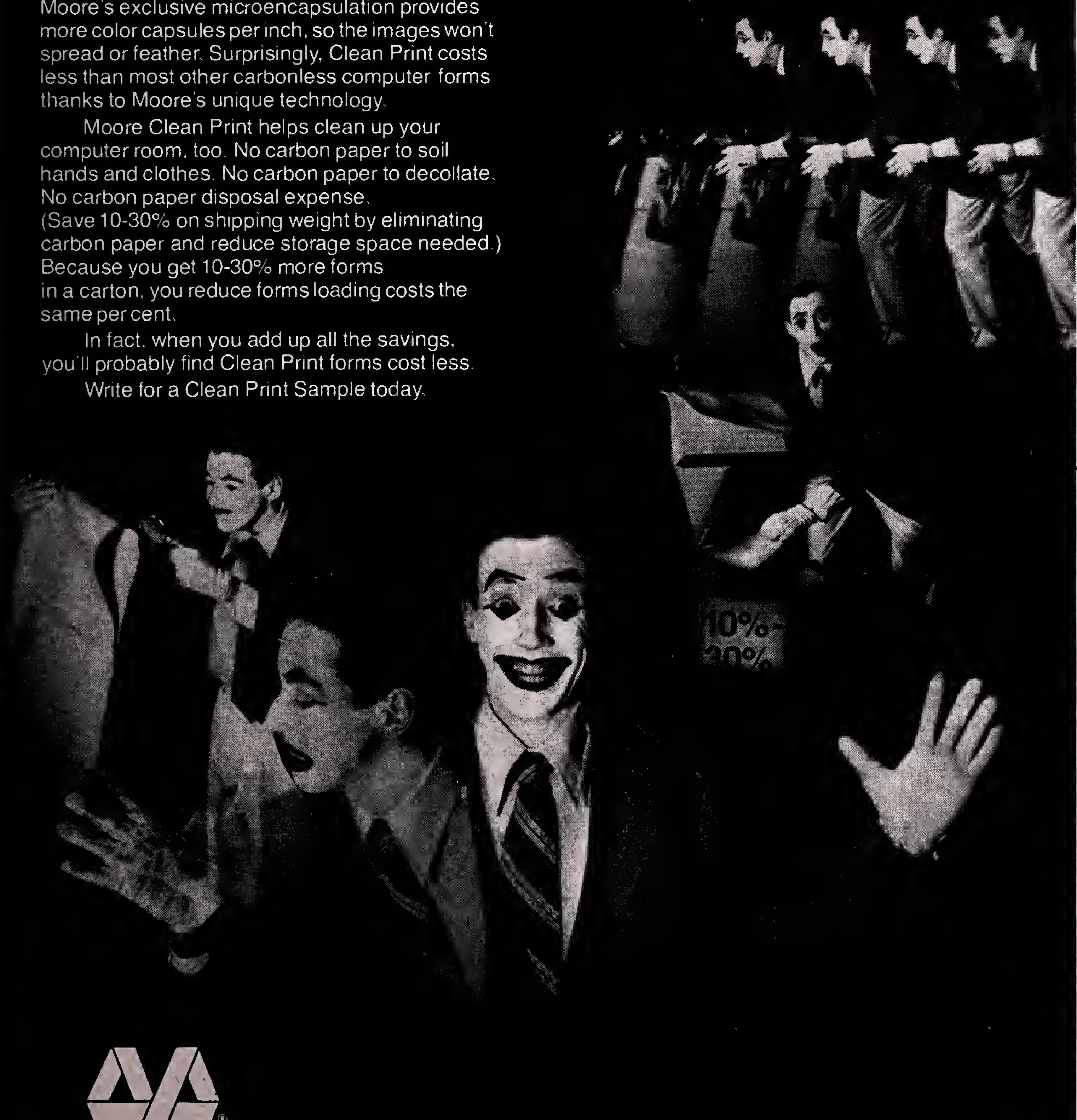

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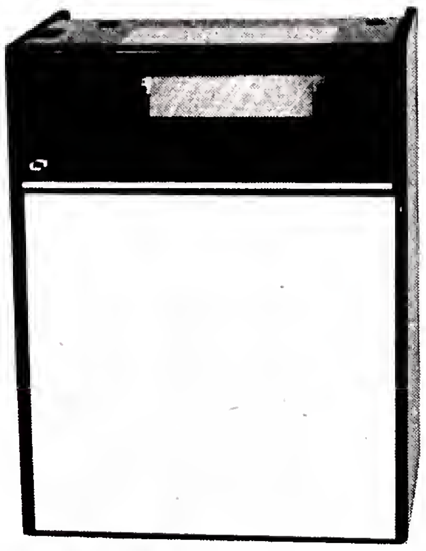

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## *Canada Warned on Need To Spend More on R&D*

OTTAWA — "Computers and communications will have a greater impact on Canada than the steam engine and the railroad," according to William G. Hutchison, president of William G. Hutchinson and Co. Ltd. of Toronto.

Speaking at the Government Computer Conference here recently, Hutchison said that "communications and information will become the 21st century's substitute for transportation systems.

"We will spend $2 billion annually for computer and information services in our homes as well as purchase $2 billion of computer equipment for our homes. We may also lose the $2 billion in newsprint export trade when newsprint is transmitted into the home electronically," he added.

The Canadian government's present opportunity to support the computer and communications industry could reap the same rewards as Sir John A. MacDonald's support of a national railroad — a policy decision that was crucial to Canada's early nationhood, he pointed out.

Hutchison noted that Canada already has viable technology, such as Teledon, for future home information services. However, its national research and development spending must be three times higher than at present to merely match other average Western nations which annually spend 2% of their gross national products on R&D.

"Like high-technology industries, a country will only survive in the technology age if it spends effectively to maintain research and development," Hutchinson said. "If we cannot afford the additional R&D funds which amount to an additional $2 billion per year for industry and government combined, we should develop effective strategies for joint developments and licensing with other countries, as the Japanese did after World War II. We could then piggyback our own developments on top of the others."

Hutchison's firm specializes in strategic planning for the computer and communications industry. He is also chairman of Telecom Network Technology, Inc. and chairman of Norango Computer Systems, Inc.

## CBI Fellowship Goes to Ceruzzi

PALO ALTO, Calif. — The 1979-1980 Fellowship of the Charles Babbage Institute (CBI) for the History of Information Processing has been awarded to Paul E. Ceruzzi, a student in the American Studies Department at the University of Kansas.

The fellowship will fund Ceruzzi's dissertation on "The Prehistory of the Digital Computer, 1936-1946: A Cross-Cultural Study." The study will focus on four early digital machines — the Zuse Z-3, the IBM Automatic Sequence-Controlled Calculator, the Bell Laboratory Model V and Eniac.

As part of the research on this project, Ceruzzi spent a year in West Germany as a Fulbright Scholar examining primary source material on the Zuse computer.

## DP Course Set For Non-DPers

NEW YORK — A seminar to help non-DPers cope with computers will be offered by the American Management Associations (AMA) Nov. 12-14 at AMA headquarters here.

Directed at administrative assistants and DP support staff, the course is designed to put DP terms and jargon into perspective. Using presentations, role playing and project sessions, the course will attempt to make non-DPers more effective in their jobs by allowing them to communicate more effectively with DP professionals.

The course begins with the basics of data processing and builds to an overview of the systems that may be part of the office of the future.

The course costs $490 for AMA members and $560 for nonmembers. The AMA is at 135 W. 50 St., New York, N.Y. 10020.

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### *No Longer Question of Technology*

# Eger: Regulation Stunting DP, Communications

OTTAWA — Federal regulatory barriers are inhibiting growth in the computer/communications marketplace, John M. Eger said in keynoting the Government Conference here recently.

Eger, a Washington, D.C., attorney, told the Canadian audience that in the U.S. "many needless regulatory and institutional barriers remain — essentially frustrating the expeditious implementation of the computer and communications technology currently available.

"For all the giant steps we are taking technologically, telecommunications and teleprocessing are progressing at only half speed. We have not taken full advantage of the new information technologies that have the ability to solve many of our pressing economic, social, educational, medical and cultural problems," he said.

As an example, Eger noted the attempts of AT&T competitors to enter the telecommunications market.

Regulations that originally had been established to aid the consumer of telephone service actually were used to help the monopolist maintain its position. All new market entrants had to go to great expense to file all the needed regulatory documents and to fight their positions through the courts to receive final approval for service.

In just the past few years, Eger observed, the pendulum has begun to swing in the direction of increased competition in this area and, "despite some setback, the promise and prospect for reform and hence a robust, wide-open market for enhanced computer, telecommunications and information goods and services never looked better."

### Congressional Roadblocks

While technology is the driving force for the changes that are coming, this has to be coupled with congressional recognition of the need for deregulation, Eger said.

However, the number of special interest groups involved in the computer/communications area is making it difficult for Congress to act, he said, predicting that reform of the communications regulations will not pass this Congress and may not even pass in 1980 or 1981.

Nevertheless, the debate over the issue of deregulation has alerted the user community to the possibilities that such deregulation would hold, and that community is now pressing such regulatory bodies as the Federal Communications Commission (FCC) into what Eger called "evolutionary reform" of the older noncompetitive situation.

In the 1980s, "with large-scale integration, fiber optics and microelectronics finding their application in almost every conceivable product or service and satellite technology being exploited for the transmission of every conceivable media mix . . . the regulatory fences must either give way to an orderly shifting and relocation or crumble in the wake of another wave of progress," Eger maintained.

### Smaller World

In many ways, Eger said, the Canadian government has been doing a better job in this area. He cited reports from the Department of Communications and several others recently done by Canadians on this subject.

"But I can only speculate that it may not be enough to assure the continued growth and development of Canada or the U.S. or any nation, now that advances in transportation and telecommunications have shrunk the world and have tied our national economies together," Eger remarked.

The dilemma is that "while we all have made great accomplishments and have spoken eloquently about the importance of computers and communications, we have failed to make the case for a comprehensive, harmonized national and international communications policy."

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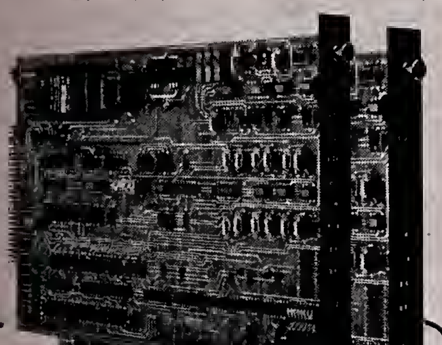

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# Small System Tabs Race Scores in Record Time

NEW HAVEN, Conn. — A new participant in this year's 20-kilometer marathon here won high praise by turning in a record-breaking time. Wearing number 405, the small computer kept score on the more than 2,570 runners as they piled up at the finish line — in a fraction of the time it took last year.

"After the race last year, compiling the results was a bummer," according to S. Richard Kalt, president of New Haven Road Race, Inc. "Although we only guaranteed times and places to the first 500 finishers from the field of 2,300, it took three and a half hours to come up with just the division winners.

"And it took a total of four solid days and nights to get complete race results together for publication in Sunday's paper. We felt that there had to be a way to improve the situation in this year's race."

That better way was a Northern Telecom Corp. Model 405 with two CRT stations and a printer.

"This year," Kalt continued, "we were not only able to determine all the division winners within two hours, but were actually able to make award presentations within three hours, which is very rare in this type of race."

Woody Stem, whose Accounting Systems Corp. provided commercial computing services to this year's race sponsor, developed and donated a series of programs to support the classic, from the registration phase through the postrace results.

"As entry forms were received, the Model 405 created a data base comprised of the name, address, age, division, assigned race number and shirt size of each participant and stored the information on flexible diskettes," Stem said. "Not only was this information merged with timing results during the race, but it was also convenient for accurately ordering prerace souvenir shirts and for producing postrace mailing labels."

At the finish line were three Heuer timing devices that allowed the race committee to create a three-section split finish line by locating timers laterally across the line.

Timer operators depressed a button as each finisher crossed the line, thus generating three steady printouts of times. Simultaneously, runners were guided into three separate chutes behind the finish line, where race officials filled out color-coded sheets from each chute with the finishing sequence of race numbers. In batches of 200, times and numbers were hand-carried to the Sheridan Plaza Hotel, where the Model 405 was located.

Operators keyed batches of race numbers, times and places into the system at half-hour intervals. "After each interval, the Model 405 merged timing device data and chute data," Stem said, "and by accessing the data base produced prior to the race from registration applications, we generated results on Northern Telecom's 180 char./sec Sprinter printer.

**Officials record contestants' numbers in chutes at the finish line.**

At the end of each batch run, up-to-date printouts were produced in triplicate and posted at different locations so results could be observed by all as the race progressed.

Printouts contained order of finish in each of nine different divisional classes and included each runner's name, overall time, average time per mile and average time per kilometer. A complete postrace finishing list was also generated.

The entry on the list for this year's No. 1 finisher, David Babiracki of Granada Hills, Calif., read: 1:03:36 (finishing time); 1 (place); 0004 (contestant number); (his name); 03:12 (average time per kilometer); and 05:2 (average time per mile).

Has the system reached its limit? By no means. "Each timer can record as many as four finishers within one second," Stem claimed. "Therefore, with our split finish line, 12 per second could have been recorded — which is far above our expected maximum of 190 per minute."

The Model 405 has already begun the planning for next year's event. "We now have names and addresses on file for selected mailings in the 1980s," Kalt noted.

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# DP 'Education' Goes On the Road in Buses

**By Tom Henkel**
CW Staff

WELLESLEY, Mass.— In what has been termed a form of "guerrilla warfare," technical education experts here are trying to get computers into schools by putting them on wheels — in school buses.

Equipped with Digital Equipment Corp. minicomputers, CRT terminals and Decwriter printers, two converted buses debuted this school year in many Massachusetts elementary and high schools. The $80,000 state-funded project is being carried out jointly by DEC and the Commonwealth Center for High Technology and Education.

DEC donated the hardware, a local transportation company donated the two buses and the Commonwealth Center got the project rolling in what it called a first-of-its-kind endeavor.

The idea, according to center director Doug Fulrath, is to tell both students and teachers that computers exist — and that there are a lot of computer-related jobs going unclaimed because schools aren't training students in the right areas.

"The job market is heading toward computers, but high schools are not. Teachers have no idea of what's happening — they're still in the '50s," DEC's Michael Odon said.

Many teachers still think computers are something out of "Star Wars," while students connect them with men in laboratory coats in rooms full of flashing lights, he added.

Both buses will cover a total of 10 communities. The primary target will be students eligible for Comprehensive Employment Training Act (Ceta) programs. Other students, however, will be allowed aboard on a space-available basis.

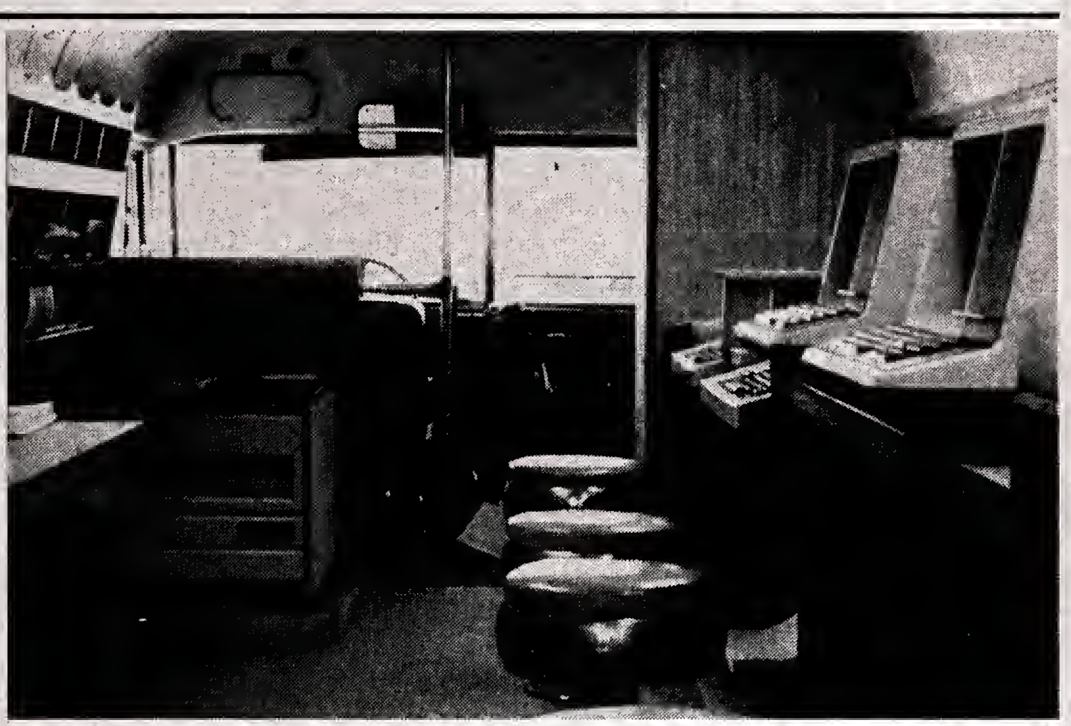
In addition to selling computers to students and teachers, the buses will also be used on weekends to visit civic groups and help adults thinking of changing careers, project coordinator Mike Potash said.

### Impossible Renovations

With seats removed, windows covered with sheet metal, air conditioning, special wiring and carpeting to cut down on the noise, the first bus was completed about three months ago. The second bus is still under renovation at the Hamdan County Manpower Consortium Skills Center in New Hampshire.

The idea of mounting minis on a school bus elicited gasps from DEC service representatives, who said the idea wouldn't fly. But impossible renovations are among the center's specialties. Fulrath — speaking from the former master bedroom of a converted mansion — said the minis were mounted with a Styrofoam-like packing material that, to date, has proved successful.

On the first bus' maiden voyage, the bus driver inadvertently drove it over a curb, causing panic among the service reps who ran to assess the damage. When they switched on the system, the service reps were surprised to see it still worked, Fulrath said.



No, it's not a DP diner — but a mini-equipped school bus.

Because of some availability problems, each bus uses a different mini. However, Odon said they both do the same things. The completed bus runs a DEC V/003 and the second bus will use an 1104 mini. Both buses will be equipped with two VT52 CRT terminals and two Decwriter hard-copy printers.

Software includes a standard supply of Basic games and simulations and a "robot turtle" — a three-wheeled plastic "blob" originally developed at MIT in an easy-to-understand programming language called Logo. The bus is also equipped for DEC's audiovisual presentations.

Each bus can hold a maximum of nine students at one sitting. Current plans call for the bus to stay at each school about a week, giving each student about five hours worth of experience with the system.

The center was quick to point out the bus is not designed to teach — it is illegal under Massachusetts law to teach in a school bus. Rather, the bus is billed as an educational aid.

With two buses, driver and trained demonstrators, the program is just getting into gear, Fulrath said. More computer buses and possibly some stationary computer education facilities are planned for future years.

The current buses will cruise in western Massachusetts around Springfield and in four communities around Wellesley.

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# 'How Citibank Protects Your Privacy' Published

By Marguerite Zientara
CW Staff

NEW YORK — Acknowledging a widespread fear that computers can and do erode citizens' personal privacy, Citibank/Citicorp has published a brochure telling customers how the bank uses and discloses the computerized and other information it has on file.

"Strictly Confidential — How Citibank Protects Your Privacy" is a 28-page publication that describes existing federal and state privacy laws as well as Citibank's policies and citizens' recourse in the face of data gathering.

In explaining its reasons for seeking information about customers and the varying degrees of information needed for different purposes, Citicorp noted that it asks the most information from people seeking credit, in an effort to minimize its own risks. While some Citicorp divisions reach credit decisions through "traditional means" — checking references, verifying employment and salary or consulting a credit reporting agency — most divisions now use the new method of "credit scoring," the booklet explained.

Credit scoring requires data on such things as income, years at the same residence and same job, existence of a savings or checking account, whether one owns a home or car and the number of dependents. Each situation carries a certain number of points.

Such characteristics have been statistically shown to be "a reliable measure of ability and willingness to pay," according to the 1977 *Report of the Privacy Protection Study Commission,* and may eliminate the need for a credit report. Citibank claimed it is a "more objective" method of predicting credit risk.

## Confidential File

After Citibank makes a decision about credit or an account, the information used to make the decision is put into a confidential file, according to the booklet. "We refer to the background information only if we're having trouble collecting an account or as a reference if you apply for a loan in the future," the booklet assures its readers.

Only people with "appropriate keys, locks, access, information and training" have access to these confidential files, according to a bank spokeswoman, and they must have a "need to know" the data.

"We also try to purge our records regularly and destroy those that are of no further use and that the law no longer requires us to keep," the booklet noted.

As for information the bank passes on to others, the booklet claims that government is "by far the biggest seeker of consumers' personal financial records." While laws now require federal agencies to notify people of information to be obtained about them so they can object beforehand, the laws do not cover inquiries from state or local governments or private parties, the publication stressed.

Citibank, however, will disclose information about a customer only in compliance with a statute or a legal order and, unless a government agency certifies that it has notified the customer, will itself notify the customer of any information disclosed, according to the booklet.

One section of the Right to Financial Privacy Act of 1979, the booklet explains, states that if the government serves a bank with a formal written request for information and gives the subject an opportunity to object, the bank may — but is not required to — turn over the information. "As a matter of policy, we will not honor [such] requests," the booklet states. "We won't release the information unless the law requires us to."

As for requests from private parties — people "thinking about going into business with you, marrying or divorcing you or hiring you" — Citibank's policy "is simple: we don't tell anybody anything without a court order or other legal process."

As with government orders, the bank will notify the customer of any information given out about him.

Citicorp handles "routine credit inquiries" from merchants and other banks by disclosing general information, except in the base of credit reporting agencies, according to the booklet.

If someone has a loan with Citibank, the bank "routinely" tells a credit reporting agency how the person has handled the responsibility. "We identify you to an agency by name, current and previous addresses, birth date, Social Security number and employer's name and address," the booklet said.

Citibank will also tell the agency what type of loan one has — mortgage, auto, personal — and the amount and terms of the loan.

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# Energy Management Proves Thrifty Measure

SAN DIEGO — A computer-based energy management system installed a year ago at Home Federal Savings and Loan here has reduced energy consumption by more than 15%, avoiding utility costs of $288,000 during its first year of operation, according to Fred Lonsdale, assistant vice-president and physical facilities manager.

The system monitors and controls all mechanical and electrical equipment at the Home Federal Tower Building in downtown San Diego, as well as at six suburban branch locations within a 10-mile radius.

A Honeywell, Inc. Delta 1000, the system is tied by leased telephone lines to a network of 150 sensors that record inside and outside temperatures and humidity conditions at the Home Federal locations. As changes are recorded, the system automatically regulates heating and cooling within the buildings.

When mild conditions exist outside, the buildings' heating and air conditioning units can be shut off, taking advantage of "free cooling," thus reducing electrical costs.

### Other Reductions

By monitoring these conditions 24 hours a day, the system also reduces energy consumption by delaying the start of mechanical equipment in the morning rather than turning it on at a predetermined time. The same data from the computer determines how early equipment can be shut down without affecting comfort levels.

"With the system, we've permitted the most cost-effective scheduling and adjustment of these energy-consuming systems, which make up half our total operating costs," Lonsdale said. "Moreover, manpower requirements have been reduced, allowing our maintenance staff to trouble shoot problems and maintain the systems at peak performance levels."

The same computer also monitors security and fire management sensors and equipment at each location.

### Ahead of Projections

First-year energy savings with the computerized system were well ahead of Honeywell's initial projections, according to Lonsdale, and equipment, installation and service fees have been recouped in lower utility costs. "Had we not installed the Delta 1000, our consumption would have been an additional 400,000 kilowatt-hours per month. Converted to dollars, this would reflect an additional cost of approximately $24,000 per month, or $288,000 for the year." he said.

"By 1981, we anticipate that all major Home Federal facilities in California will be tied to the system," he added.

"Computer-based energy management is coming of age now that the energy crisis is showing signs of becoming permanent. While utility costs have escalated at a rate of 34% this past year, we've found a viable solution to reducing our energy consumption without sacrificing comfort," Lonsdale stated.

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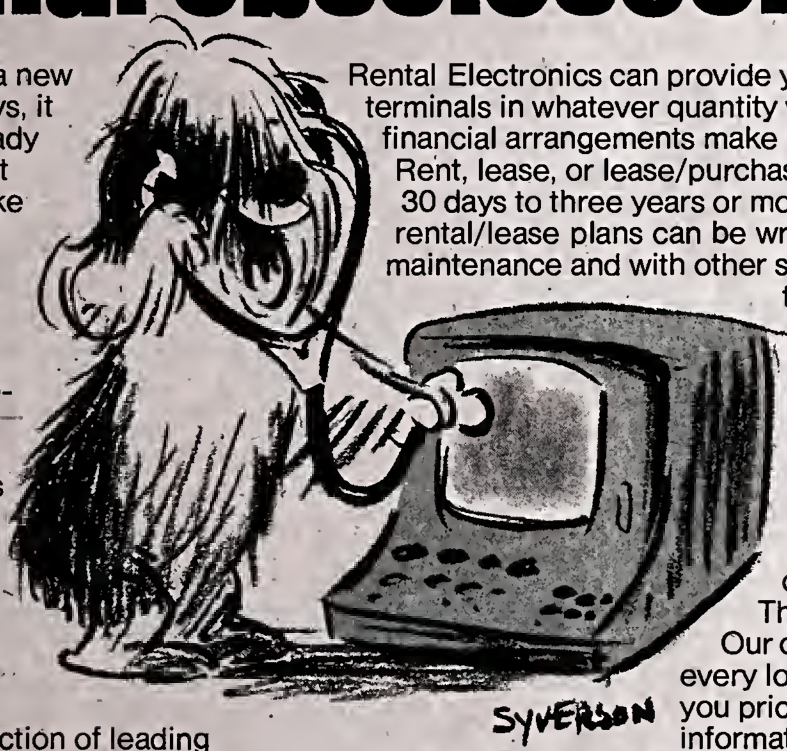

As soon as you take delivery on a new printer or data terminal these days, it seems the next generation is already being announced. Chances are, it has capabilities that begin to make your "new" equipment obsolete. Now, thanks to Rental Electronics, you can have your terminals and highest technology, too.

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If you're interested in more information on renting printers or terminals from Rental Electronics, call one of our local rental centers today. They're listed opposite. Our on-line computers at every location let us give you price and availability information instantly, while you're still on the phone. In the meantime, check some of our featured rental offers below.

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Here is a sampling of the printers and data terminals available from Rental Electronics. Call or write today about your specific needs.

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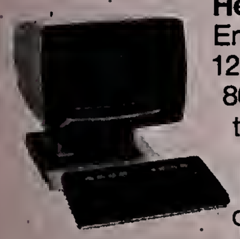

**Hewlett-Packard 2621A/P Terminals** Enhanced 9 x 15 dot character cell, full 128-character ASCII character set in 24 80-character lines. Two pages of continuously scrolling memory. RS232C and Bell 103A compatible. 110 to 9600 baud. 2621/P includes built-in printer operating at 120 cps.

**Tally T-2000 Hush-Tone Line Printer** Acoustically designed enclosure. Operates at 125 (Model 2100) and 200 lines/minute (Model 2200) with standard 64 character USASCII. Line spacing switch selectable, 6 or 8 per inch.

**ADDS Regent 200 Terminal** 24 lines x 80 characters, 25th "status" line shows operating mode. 128 character ASCII. RS232C/CCIT V.24 communications interface operating 75 to 19.2 BPS, switch selectable. Buffered transmission, auxiliary ports.

**Beehive Micro B 1A Terminal** 128 ASCII character set; switch selectable scroll/non-scroll mode; X-Y addressing; 24 x 80 display format; single key memory lock; fully buffered communications to auxiliary peripheral device.

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# EDITORIAL

## Low Blow to Women

A perfect example of the sexism in DP advertising — as lamented by Marcia W. Levy in a letter to the Editor [CW, Sept. 10] — is Pan-Energy Corp.'s announcement of its "Girl Friday" Model B-20 small business system (See Page 49).

While the product offers a lot for the money (a microprocessor-based small business system with 48K of random-access memory and system software for $5,750), its name, which appears on the machine, is an insult to women.

By implying that only females would be likely to use the machine, Pan-Energy perpetuates the slowly disappearing myth that men are inherently more qualified than women to hold positions of responsibility in business. Furthermore, Pan-Energy slights the dignity of womanhood by implying that a female CRT operator is a "girl" — a child.

And although we are singling out one company whose transgression is particularly blatant, many other DP firms must share the blame. In the future, vendors should consider the far-reaching, and possibly damaging, effects of their ads.

## Looking at the Profession

The nature and objectives of computer science are curiously obscure. Physicists, chemists, biologists, astronomers and geologists usually find it easier to explain what they do for a living. Why?

An obvious, if not fully satisfying, answer is that computer science lacks the *maturity* of those "traditional" natural sciences whose practitioners have had centuries in which to define terms, polish fundamental models and secure patronage from government and industries.

Another reason computer science seems harder to define is that the traditional sciences are more relevant to the most basic human needs and desires.

Nevertheless, technologies like data processing that derive from computer science are starting to have a profound impact on the quality of life in society. This gives increasing importance to the ways computer scientists are trained and their research administered.

Debates about the scope and intent of computer science can be lively and fruitful at universities where this training and administration takes place.

The recent inaugural symposium of Brown University's computer science department was a case in point [CW, Sept. 17]. In fishing for a "bridge between theory and practice in computer science," the Brown computer science faculty showed commendable sensitivity to the status of their profession and what it may offer the rest of the world.

# DATA PAST

### Five Years Ago
### Sept. 25, 1974

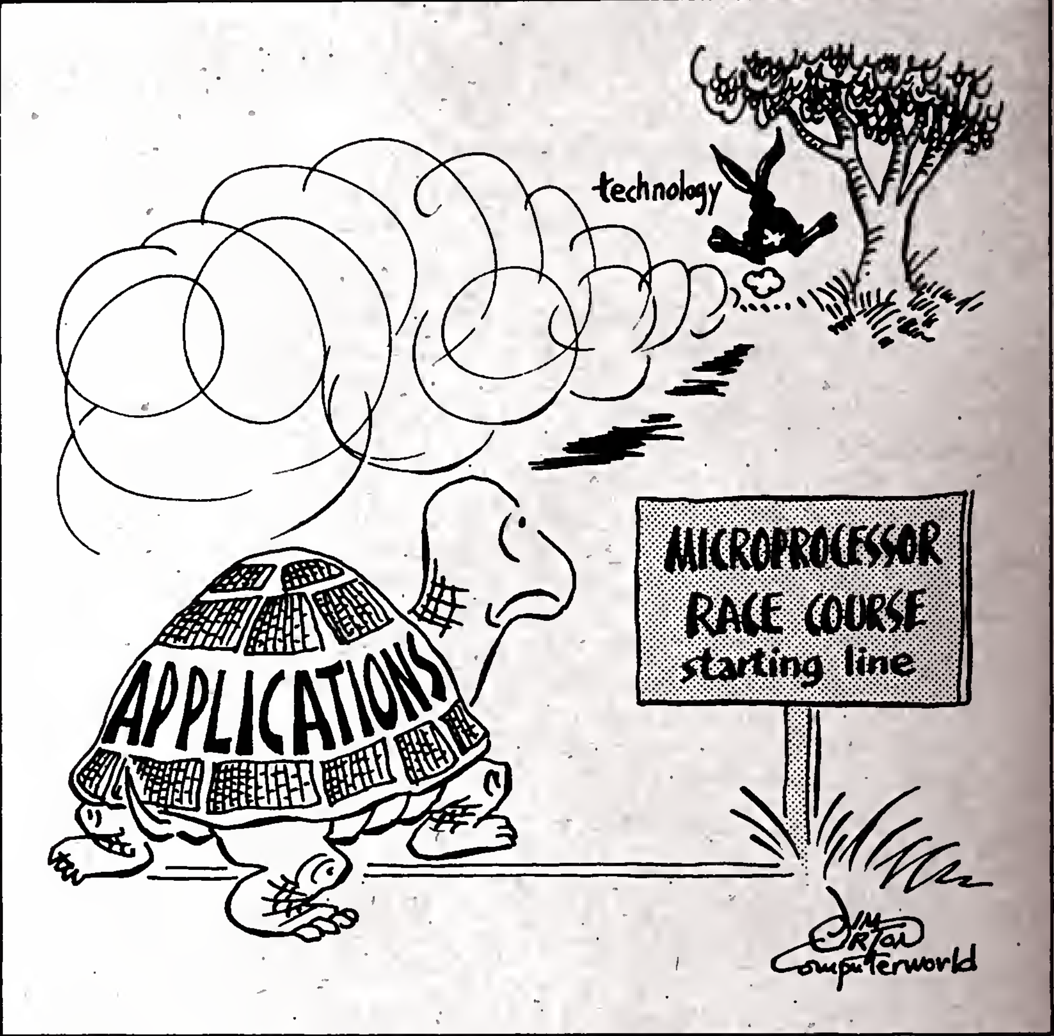
Most users of IBM and Univac equipment in the U.S. were told to expect higher lease maintenance charges by the first of the year. The IBM increases were to affect nearly the entire 370 line and most new peripheral equipment and ranged from 6% to 8%. The Univac increases averaged 6% and covered "the most widely used" gear.

### Eight Years Ago
### Sept. 22, 1971

WHITE PLAINS, N.Y. — IBM announced that it would provide individually tailored, fully operational programs at fixed prices for System/3 Model 6 users. Under a fixed-price, extra-cost option, it would provide RPG-II source code for programs designed under the Application Customizer Service for 3/10 users.

— — —

On the 25th birthday of Eniac, generally considered the daddy of all electronic computers, CW interviewed its developers, J. Presper Eckert Jr. and John W. Mauchly, on the past and future of DP. "In 1960," Eckert said, "we reached the point where it was estimated half of all our manpower went into clerical work, and the percentage was increasing. Since then, it has roughly leveled off. This leveling has been the most significant effect of data processing on society."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# LETTERS

## Don't Forget Time-Sharing

The recent editorial "Waiting for the 4300" [Sept. 10] maintained that the DP manager owes it to his organization to look at alternatives if he finds himself in such a position.

But your list of alternatives omitted what could be a most valuable option: time-sharing services.

By processing development work on an IBM-compatible time-sharing service and later transferring that work to an in-house IBM 4300, a DP manager can avoid the confusion and cost of several in-house hardware installments.

While this usually provides an excellent short-to-medium-term solution to upgrades, a DP manager may find that time-sharing is the best overall approach to processing.

James D. Sutorus
Cleveland, Ohio

## 'Subjectee' Speaks Out

"DP Jargon Faulted in User-Designer Rift," stated the headline to the Sept. 3 Taylor Report. "Quite right, too," I said to myself. In an industry infested with pompous, self-indulgent terminology, any efforts to promote the use of unadulterated English are to be applauded.

Hardly had my hands come together for the first clap when I was confronted by four pages of reports on the Small Computer Show which seemed to have been inflicted with a bad dose of "attendees." "Attendees," it stated, "were told"; they "stopped, looked and listed"; they "put the TRS-80 through its paces"; they completely dominated the show. There were even "junior attendees" presumably accompanied by "senior attendees" (that is, Mother Attendee, Father Attendee or Big Brother Attendee.)

Were these junior attendees being educated to become "educatees"? Had they been invited? If so, they were presumably also "invitees."

One of the funniest misuses of the dreaded double "e" must have been on the bus sign that warned sternly, "No more than six standees are allowed," conjuring up the delicious vision of the six hapless passengers prostrate on the floor while the rest of the bus used them as a carpet.

I am only a "donee" of your newspaper but would ask on behalf of your readership that we not be made "subjectees" of such lazy journalism.

Adrian J. O'Conner
Salt Lake City, Utah

## No Dilution in Title

I read the letter from John Shannon in the Sept. 10 issue "'Dilution' in Titles" with some amusement. I trust he espoused his theory with his tongue firmly in his cheek.

While it is true that smaller firms now have DP installations, this has no more "diluted" the title of DP manager than smaller firms have "diluted" the title of "president" or "chairman of the board."

It seems to me that in a "tiny one- to two-man installation" the individual bears a higher percentage of the departmental responsibility and consequently contributes a higher percentage to the company's success or failure. I assume most are being compensated accordingly.

Perhaps Shannon would be less concerned if titles were limited to employees of companies on the Fortune 500 list, but there is a vast difference in size among those companies as well.

My thinking is that DPers' salaries are settling into line with those of other white collar workers. There appear to be many more people staying with their present employers in the DP field now, and in so doing, getting a smaller raise while realizing benefits in nonpecuniary areas.

I hope this reflects increasing maturity in our field and in our colleagues.

Thomas J. Westdrop
Germantown, Wis.

**HUMAN CONNECTION/Jack Stone**

# DP Department Plans Must Answer 'Political' Needs

"So, where are you all headed?"

"We have dual IBM 370/158s running under MVS, 3033 upgrades on order to boost our remote support plus more TSO tubes and will be going to 4300-class machines in five years."

Responses like this run rampant at any IBM user's meeting, and similar ones are forthcoming whenever DPers from different installations get together. It is fascinating that, among DPers, basic strategies underlying complex systems plans — involving millions of dollars — can be transmitted and received within a matter of minutes.

DPers are impressive in their ability to communicate vast amounts of information in a few terse words. This quality helps them in every facet of their jobs, from handling assignments in a project team to leaking unannounced product information at a user group cocktail party. The reason they are so effective is that they are used to working with highly encoded information and all the DPers know the meaning of the codes.

But DPers sometimes forget that the rest of the business world operates in similar ways. Executives deal in codes, too, and communicate effectively in their milieu with them. Terms like "market forecast" and "production schedule" and "profitability" are heavy with meaning to them and constitute part of the jargon of the executive "trade."

In certain respects, executives pack even more information into their words, because these days they deal with issues far beyond those of getting products to consumers and money in the bank. They have to struggle with "environmental impact" and "equal opportunity" and "societal responsibility."

These notions help build a basic strategy for getting top executives to both understand and agree to a long-range plan, a subject I talked about in last week's column.

For years now, DP managers have been going forth with planning justifications for increased budgets to support more DP hardware. But the tone of the presentations has been related to

(Continued on Page 28)

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**READER COMMENTARY/ A.W. Clausen**

# Electronic Banking: A Letter in Response

Dear Dr. Grosch:

Your letter raised important points regarding electronic banking and future payments transfer systems [CW, Sept. 17].

My response is essentially from the perspective of Bank of America, and while many of the trends I mention are nationwide, I will not presume to speak for the entire banking industry.

*Clausen answers an open letter from Herb Grosch which appeared in last week's issue.*

During the evolution of Bank of America over the past 75 years, we have attempted to develop financial services — in design and delivery — which proceed from the needs of our customers and not from the convenience of the bank.

To "push" electronic banking upon unwilling customers would result in resentment, and such an action would be self-defeating.

However, we do believe that the relatively new technology of electronic funds transfer — automatic teller machines, debit cards, point-of-sale (POS) terminals, direct deposit and so forth — is an efficient and valuable means of providing traditional banking services. Moreover, electronic innovations are capable of increasing customer convenience, reducing paper volume and processing costs and keeping the price consumers pay for financial services as low as possible.

We also believe electronic banking is one of several funds transfer systems — including checks — that can and do co-exist.

Checks represent a convenient, well-known means for customers to pay bills or to draw cash from their accounts. Predictions of a rapid decline of checks, made 10 years ago at the advent of electronic banking, have proven inaccurate. Indeed, the number of checks written each year — currently about 35 billion — is not expected to level off until the turn of the century.

The continued popularity of the paper check system challenges us, and

(Continued on Page 29)

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**THE TAYLOR REPORT/Alan Taylor**

# Standard-Source Cobol to Be Expected in '80s

Last week I had the enjoyable task of writing and testing a couple of Cobol programs in only a couple of hours, using a Cobol generator from David Black and Associates in Pittsburgh. Working from a terminal, I entered details of the function of the programs, field descriptions and names. With these, the system set up files, produced Cobol source programs, compiled, prompted me to add records to the files and then ran them in a way that left me very impressed.

For pure productivity, I haven't seen the like anywhere, and it certainly made Cobol look like a strong contender for being the most productive commercial language of the 1980s — as well as that of the '60s and '70s.

However, the really interesting thing came later, when I sat down with the printouts and examined the Cobol source code produced by the generator. The Cobol coding standards of the '80s seemed to be appearing. The code was clearly different from Cobol code in general, and it had much greater potential for reducing maintenance costs and increasing transferability than anything I am used to.

## Portable Programs

Programs of the '80s will generally be required to run on systems other than those on which they were originally programmed. The organization of hardware and networks is changing, such that it is now common to have different vendors' systems in different parts of a firm. Users will need to be able to move Cobol programs around as freely as possible.

In the past, this has not been possible unless a program-by-program checkout was made against each compiler. This is expensive and time-consuming.

In the Black output, however, the Cobol code produced is restricted. The verbs are basic and fit onto any compiler. Similarly, the names are designed to be portable. Machine- or compiler-specialized material is kept out of the generated language.

The generated source code is therefore portable — totally portable. Black has successfully generated that same code for many different systems for years now, using separate packages only for JCL areas, but keeping the major Cobol source standard. It works — and it fills a need for the '80s which, incidentally, was not really there in the '70s.

As a standard for Cobol coding in the '80s I see using the central elements of the language — the "standard" area. Rather than jumping off into the parts of the Ansi standard that are not generally used, Cobol coding should stay in the safe area. That seems a good standard to adopt, if a bit pedestrian.

## Maintenance Cost Reduction

Even more important, however, I see reduced maintenance costs in the programs that were produced, because they were themselves standardized. Look at the extract of the code handling the acceptance or rejection of a change on the records file.

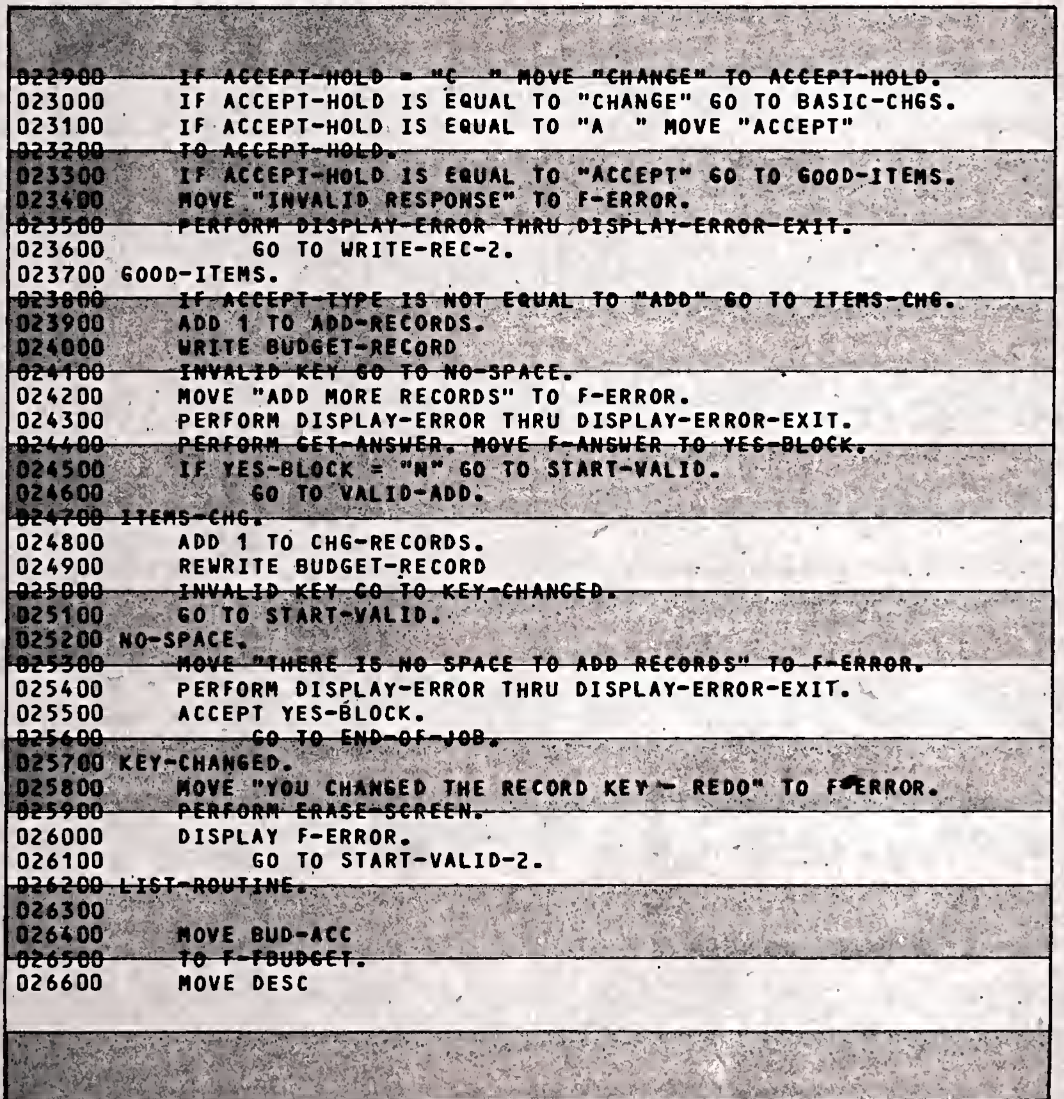
I assure you I did none of the programming here. It was generated from my request to provide a means of accepting changes to the specified file. I was quickly able to not only read the code, but to see how on *any* program produced by the same generator, a problem connected with a record change would be handled the same way.

There would be a "Good-Items" paragraph, a "No-Space" Paragraph, an "Items-Chg" paragraph, a "Key-Changed" paragraph and so forth. In the paragraphs the logic would be arranged in the same order.

The field names would be similarly based upon the functions involved. The same appropriate actions would be performed in the same place. In short, I could detect and diagnose problems with programs I had never seen.

Of course, the corollary holds. If there is some logical error in the

(Continued on Page 28)



```
022900        IF ACCEPT-HOLD = "C   " MOVE "CHANGE" TO ACCEPT-HOLD.
023000        IF ACCEPT-HOLD IS EQUAL TO "CHANGE" GO TO BASIC-CHGS.
023100        IF ACCEPT-HOLD IS EQUAL TO "A   " MOVE "ACCEPT"
023200        TO ACCEPT-HOLD.
023300        IF ACCEPT-HOLD IS EQUAL TO "ACCEPT" GO TO GOOD-ITEMS.
023400        MOVE "INVALID RESPONSE" TO F-ERROR.
023500        PERFORM DISPLAY-ERROR THRU DISPLAY-ERROR-EXIT.
023600              GO TO WRITE-REC-2.
023700 GOOD-ITEMS.
023800        IF ACCEPT-TYPE IS NOT EQUAL TO "ADD" GO TO ITEMS-CHG.
023900        ADD 1 TO ADD-RECORDS.
024000        WRITE BUDGET-RECORD
024100        INVALID KEY GO TO NO-SPACE.
024200        MOVE "ADD MORE RECORDS" TO F-ERROR.
024300        PERFORM DISPLAY-ERROR THRU DISPLAY-ERROR-EXIT.
024400        PERFORM GET-ANSWER. MOVE F-ANSWER TO YES-BLOCK.
024500        IF YES-BLOCK = "N" GO TO START-VALID.
024600              GO TO VALID-ADD.
024700 ITEMS-CHG.
024800        ADD 1 TO CHG-RECORDS.
024900        REWRITE BUDGET-RECORD
025000        INVALID KEY GO TO KEY-CHANGED.
025100        GO TO START-VALID.
025200 NO-SPACE.
025300        MOVE "THERE IS NO SPACE TO ADD RECORDS" TO F-ERROR.
025400        PERFORM DISPLAY-ERROR THRU DISPLAY-ERROR-EXIT.
025500        ACCEPT YES-BLOCK.
025600              GO TO END-OF-JOB.
025700 KEY-CHANGED.
025800        MOVE "YOU CHANGED THE RECORD KEY - REDO" TO F-ERROR.
025900        PERFORM ERASE-SCREEN.
026000        DISPLAY F-ERROR.
026100              GO TO START-VALID-2.
026200 LIST-ROUTINE.
026300
026400        MOVE BUD-ACC
026500        TO F-FBUDGET.
026600        MOVE DESC
```

This extract of some Cobol paragraphs generated by the Black and Associates programs shows that maintenance costs of Cobol programs can be substantially reduced in the next decade.

# LETTERS

## Certifying Auditors

S. Walter Sauls' letter concerning DP auditor certification [CW, Aug. 27] contained a number of inaccuracies and questionable inferences which require clarification.

His reference to an EDP Auditors Association program was incorrect. The EDP Auditors Foundation administers this certification program, which is available to all professionals in the DP audit community — not only EDP Auditors Association (EDPAA) members. Indeed, 53% of the reviewed applicants as of June 1979 were *not* members of the EDPAA.

Although the Common Body of Knowledge for EDP Auditing research project (CBK) will not be published until this fall (because of a delay in full funding received this spring), a CBK draft was given to the certification board for development and implementation of Phase I Professional Experience Provision requirements. Phase I, which ended June 30, 1979, required five years of DP auditing experience or a combination of DP audit, manual audit and DP experience. Other professional organizations have "grandfathered" experienced individuals prior to offering a formal examination.

Sauls incorrectly stated that six years' experience is required and that the evaluation procedure is inappropriate: ". . .no way to tell if they have six years of experience or one year six times."

Our certification board applies specific, uniform criteria as to types of acceptable experience attested by supervisors. Phase II requires a written examination which will be given by the foundation during 1980. The categories of questions in the examination will be consistent with types of Phase I DP audit experience requirements. Thus, the two knowledge bases will be similar.

All certificate holders are required to satisfy continuing education requirements.

DP auditing draws upon knowledge and methodologies from both DP and auditing. Sauls' suggestion that the Certificate in Data Processing (CDP) examination be acceptable for DP auditors is seriously misleading. The CDP examination was developed for DP management. Although much of this required knowledge is important for DP auditing, specialized DP control evaluation and auditing techniques are unique to the forthcoming EDP Auditors Foundation's examination.

DP auditing, as a formal profession, is relatively new. The EDP Auditors Foundation and other professional audit organizations continue to expand their professional programs to support DP auditors.

Martin L. Bariff
Executive Vice-President
EDP Auditors Foundation
Hanover Park, Ill.

## Taking Micros Seriously

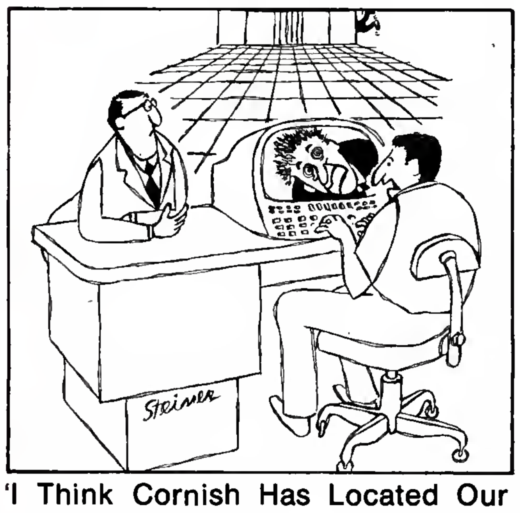
"Who's Doing All That Personal Computing?" [CW, Aug. 20] showed that Joe Rigo doesn't view the personal computer market seriously. He went to a bankruptcy hearing for a local computer store and considered it "lighthearted summer amusement." He then categorized the clientele of computer stores and demeaned them for the way they use their systems.

Rigo complained about having to walk past CBs and TV sets in Radio Shack stores to get to the computer department. In the stores I have been in, the computer is displayed prominently at the front. Hasn't he seen a Radio Shack Computer Center?

Sure, the personal computer business has many problems. Rigo pointed out, correctly, that the cost to personalize a packaged system ridiculously outweighs the original investment. I feel that there is going to have to be an adjustment in thinking on how to create and modify software.

Whatever innovative solution is found, I believe personal computers will be going into homes, not only "big corporations, where [they] belong," as Rigo stated. I am not willing to "wait patiently until IBM gets around to showing everyone else how to sell small systems."

David R. Jaschke
Houston, Texas



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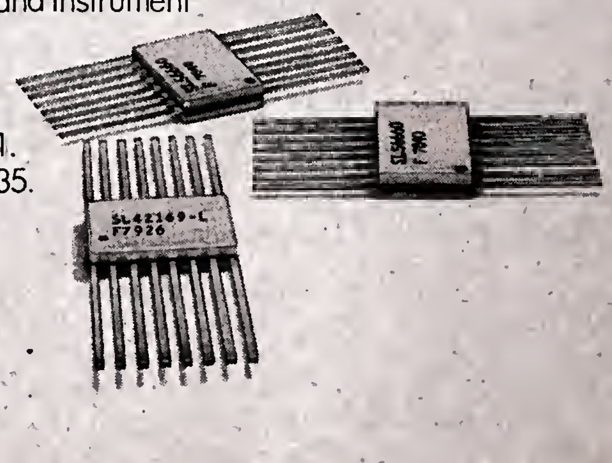

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# LETTERS

## In Defense of 'TGIF'

I usually enjoy reading the different perspectives offered in "Reader Commentaries," but R.L. LaFara's recent attacks [CW, Aug. 27] on R.A. Cornish's TGIF algorithms [CW, June 4] seemed so ill-considered that they cannot pass unchallenged.

LaFara insisted upon labelling Cornish's bits-months association algorithm as "tricky," while failing miserably to supply any criteria or definition except to say that "without extensive documentation, such a program (algorithm?) is nearly impossible to understand." Using this definition, it is difficult to imagine that there can be such a thing as a tricky algorithm.

To illustrate, would LaFara term an implementation of C.A.R. Hoare's Heapsort an example of tricky programming? Even with extensive commenting, it certainly would be difficult enough to understand. (LaFara's suggestion that one include a comment such as: "The following code implements Heapsort," seemed to be a bit of sophistry akin to: "A=A+1 /*Increment A by 1*/").

There is nothing staggeringly sensible about our enumeration of days, months and years and no reason to expect any algorithm which embodies it to be transparently obvious. Certainly, to mention Zeller's algorithm while espousing a diatribe against tricky programming borders on the fantastic. Is LaFara aware that his proposed solution contains an error? If not, try coding Zeller's algorithm, then evaluate it with an input of March 1, 2000 and try to use the resulting negative number as an array index to get the day string.

LaFara's coherent one-sentence explanation of Cornish's scheme belies LaFara's later claim of its incomprehensibility. I will take Cornish's working algorithm to LaFara's nonworking one any time.

For readers interested in a full complement of day/date/Julian-day conversion routines, "Small Systems World," July 1978, contains a complete set written by Edgar Pass. They are very short, portable constant-time routines involving only integer arithmetic. They are also full of incomprehensible constants and expressions and are not "known methods." Perhaps for these reasons, LaFara would call them tricky. I don't. I call them useful.

I believe LaFara was arguing that we should use common sense in devising programs, and this is a premise all of us would endorse. At the same time, though, not all problems are simple, and the application of the obvious can yield a result that is cumbersome, inefficient and even bizarre.

Imaginative, creative and intelligent solutions are as useful in computer science as anywhere else, and if Cornish has discovered one, more power to him.

Steven G. Duff
Orange, Calif.

## Day-of-Week Algorithm

In regard to Robert LaFara's article, "Programming Should Not Be Based on Tricks" [CW, Aug. 27], I could not agree with the statement more. His only problem is that he recommended an algorithm for finding the day-of-week that he admitted is "tricky." That problem can be solved very easily without tables and with very little coding and you don't have to be familiar with someone's "congruence" and odd month numbering system to understand its use. The steps are as follows:

**A. YYDDD = YY = Year**
**DDD = Julian day of the year**

**1. 365.25 * YY = XY**
**2. DDD + XY = XY**
**3. If the two decimal positions = zero subtract 1 from XY**
**4. XY (whole number only) ÷ MOD 7**
**5. Remainder indicates day-of-week**
**Sunday = 0, Monday = 1 and so on.**

**As an example, let's use LaFara's date of Jan. 1, 1980.**

**YYDDD = 80001**
**1. 365.25 * 80 = 29220.00**
**2. 001 + 29220.00 = 29221.00**
**3. The decimal positions are zero, therefore 29221 - 1 = 29220**
**4. (29220) MOD 7 = 2 = Tuesday**

This process does depend on having the Julian date, but arriving at this date can be achieved very simply in many different ways that most people probably already have in their systems.

I in no fashion claim credit for the above method nor do I know its origin. I picked it up several years ago and thought I would pass it on to whomever wants to use it. It is simple, straightforward and free of "tricks."

Mardell M. Lind
Des Moines, Iowa

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# DP Plans Must Respond to 'Political' Needs

*(Continued from Page 25)*

how the money will help the *DP organization* "better fulfill DP responsibilities to . . . " and "improve productivity of DP personnel since . . ." and "speed the flow of jobs through the system because . . ."

If all is hunky-dory with the coefficient of user satisfaction, no problem. But if the users, rightly or wrongly, are dissatisfied with the DP service and are vocal about their unhappiness (ever met one that wasn't?), then the plan must address — up front — what will be done to resolve the user problems. Anything less tends to appear as though the DP contingent is ignoring its "political" responsibilities, as it were, which are very much a part of the DP manager's job.

But there are more reasons than just one to talk about the users in the front end of the plan. For one, executives in businesses and government agencies — save a fairly small percentage — have yet to hear from the DP organization how shoveling all those dollars down the DP chute will clearly result in improved services or more sales or less waste or better products or faster deliveries and so on. They want to read a brief document that describes, clearly, the relationship between DP dollars and significant improvements in operations elsewhere in the organization.

### DP as Service

Executives view the DP department as a service organization, a very important one, but service nevertheless. It is obvious that their primary measure of performance is the quality and quantity of support given to the users. I believe they more or less take for granted that the DP department is running in an efficient and effective way and that internal operations are of secondary importance.

A classic example of what I'm talking about occurred last year. I was a guest at a meeting of systems professionals, and the after-dinner speaker was a vice-president and director of information systems for a well-known retail chain. One of that small but growing group of executives who have come from the DP ranks, he was the most effective, if not thrilling, DP speaker I'd ever heard.

I can almost quote him verbatim. "The idea in the retailing business is to buy some goods on credit, then get them in the store and sell them, using the customer's money to pay for the goods. It used to take us 33 days from the time we ordered some goods to the time we collected the money. The shorter we can make this turnaround, the more money we make.

"So, to justify the DP budget, I found a formula which related DP expenditures to days saved in cash turnaround. The top executives understood my plan in a second and gave me the money. I gave them the system, we reduced the turnaround substantially and now we are the most financially successful retailer in our class."

*Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave., N.W., Washington, D.C. 20007.*

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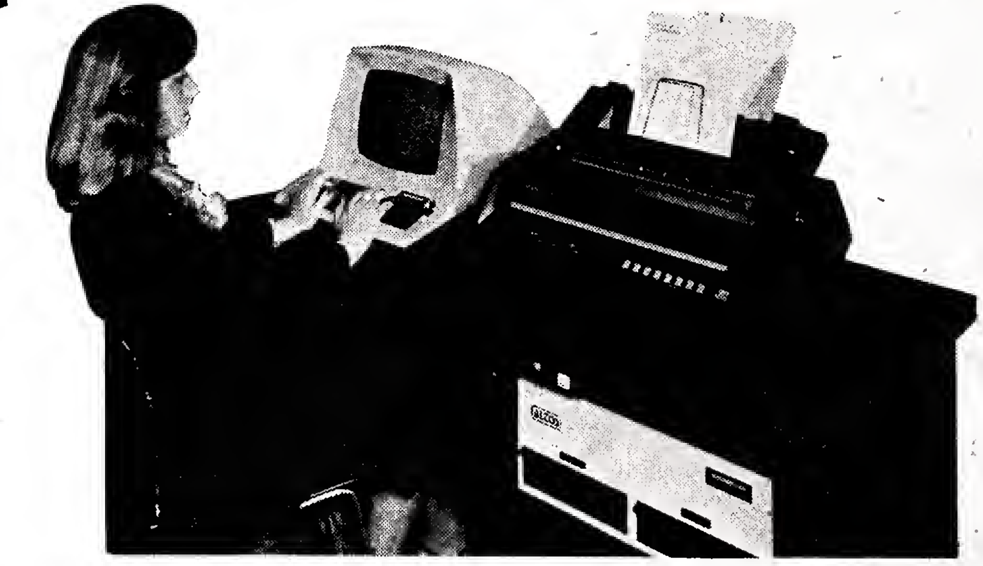

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# Cobol Coding Headed for '80s

*(Continued from Page 25)*

"Items-Chg" paragraph, it will be in all of them.

It is also likely the problem will be detected in someone else's system first, and it may be removed from my system without ever having hurt my operations. In this way, maintenance becomes preventative even at source-Cobol level. And that is a certain plus.

### Standard Source

In fact, standard-source Cobol seems to be what we can expect in the '80s. Standard source, whether from generators or otherwise, is certainly much easier to maintain than source code that has to be reviewed at length and with all sorts of possibilities in mind.

Maintenance in the '70s has been one of the greatest cost elements. It currently is so great that at times the whole English-language concept of Cobol seems destined to be lost in the search for cost reductions.

By using portable Cobol facilities with standard Cobol sources, Cobol users can cut costs and keep the English language advantage, too. I think that they will do so — whether by using the Black generator or something else, or just by old-fashioned good management and discipline.

How it is done doesn't really matter. What does matter is that the user see how Cobol performance can be improved in the future. Here is one way.

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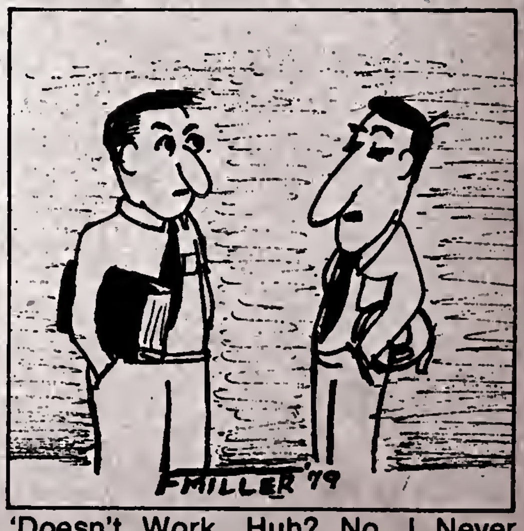


'Doesn't Work, Huh? No, I Never Wrote Any of Those Programs.'

# Electronic Banking: Bank of America's View

*(Continued from Page 25)*

the industry, to improve check acceptance and to increase efficiency and productivity in check processing.

At Bank of America, we have harnessed new generations of hardware and software to increase our effectiveness in handling the more than 10 million items we process each day. In doing so, we have experienced substantial productivity gains.

While new technologies are more readily adaptable to the internal operations of a bank, the development of electronic banking services for consumers is an evolutionary process. It takes time to develop, test and fine-tune new services and delivery systems. Bank of America's Money Convenience System — utilizing electronic banking — is an extension of what we always have done to make banking more convenient for our customers: improved and expanded our services to meet changing needs.

The difficulty consumers may encounter in check cashing, at supermarkets and merchants, stems from an increase in losses attributable to fraudulent identification — amounting to $10 billion in 1978. To counter potential fraud, businesses may initiate check-cashing procedures that are bothersome and irritating to consumers.

The American Bankers Association, the Bank Administration Institute and many individual banks are attempting to find solutions which would maximize consumer convenience and minimize merchant fraud exposure.

One approach, utilizing electronic banking technology to improve the check system, is the POS terminal Bank of America has introduced to merchants. In addition to credit card authorizations, these terminals can provide check verification and check guarantee.

Electronic technology is also providing greater convenience in check cashing at banks. Bank of America uses nearly 9,500 CRT terminals, in a Community Office On-Line System, to provide immediate account information.

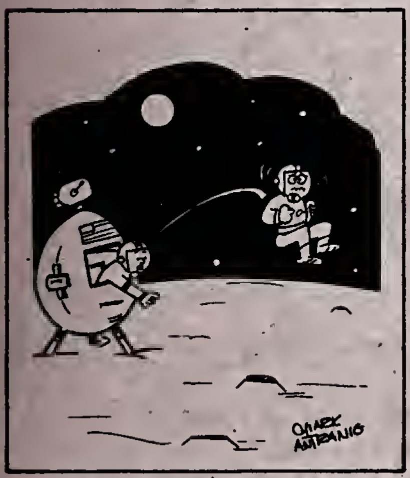
When properly designed and administered, a bank's check guarantee program can aid consumers and merchants alike. The Bank of America check guarantee card is now held by almost 1.8 million people and is widely accepted by merchants.

While one major New York bank has joined a national check guarantee program charging consumers for its service, Bank of America does not intend to initiate a charge to customers for check guarantee.

In summary, Bank of America believes that electronic banking enhances our ability to continue to improve our delivery of quality service. Electronic banking is an innovative and convenient method of funds transfer that may be used independently or may supplement and improve the traditional paper check system.

We share your belief that technological advances should be used prudently and intelligently to meet the needs of consumers, thus safeguarding public confidence and further acceptance of new banking services.

A. W. Clausen
President
Bank of America
San Francisco, Calif.



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*DatagraphiX recently spoke with Mr. James Hamrick, President, Service Division of Datatel, Inc., Alexandria, Virginia, about his company's decision to move to an in-house COM system.*

**DATAGRAPHIX:** "Jim, why did you decide on a DatagraphiX system instead of going to a COM Service Bureau?"

**HAMRICK:** "It turned out that an in-house operation was the most cost-effective solution to handling our COM requirements. With a DatagraphiX minicomputer driven COM unit we were able to upgrade our operation with minimum conversion time and expense. We ended up with excellent control, higher quality output and lower operating costs than we ever expected."

**DATAGRAPHIX:** "What do you mean by control?"

**HAMRICK:** "We're able to maximize COM's full cost saving potential by having the equipment in-house. It's here 24 hours a day, allowing immediate turnaround. Each day's data is processed onto fiche that night and returned the next morning."

**DATAGRAPHIX:** "By going in-house, what happened to your overall costs?"

**HAMRICK:** "We've found that the more we use our in-house system, the more we save. It costs next to nothing to add an entirely new job. So we've been using it for a lot more applications. Overall, our monthly savings have continued to increase even though we've greatly expanded our volume."

**DATAGRAPHIX:** "Are operator costs included in those monthly savings?"

**HAMRICK:** "No. Because DatagraphiX equipment is highly automated, our regular computer operators can now manage our COM production as well. We also have a DatagraphiX duplicator that simplifies the collation and distribution of microfiche copies."

**DATAGRAPHIX:** "Was operator training difficult?"

**HAMRICK:** "Not in this case. The Mini-AutoCOM is simple to operate. Our current staff picked it up in no time. DatagraphiX came in and showed us everything we needed to know."

**DATAGRAPHIX:** "Why did you buy a system instead of leasing one?"

**HAMRICK:** "We decided to buy for the immediate return on our capital investment, which, by the way, is good. The monthly lease payments were attractive, but for us, buying outright and taking advantage of the investment tax credit was the way to go."

**DATAGRAPHIX:** "Any regrets with the decision to go in-house?"

**HAMRICK:** "None at all. With the Mini-AutoCOM we found we could have our cake and eat it, too."

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## Open to Government, Private Sector

# Cpeug to Explore Impact of DDP on CPE

**By Don Leavitt**
CW Staff

SAN DIEGO — How will computer performance evaluation (CPE), traditionally a concern of large centralized DP operations, change in an era of more widespread decentralized data processing (DDP)?

That is the question to be addressed by Prof. Peter J. Denning of Purdue University and by a special panel chaired by consultant Michael Morris, as well as by other parts of the program of the CPE Users Group (Cpeug) when it meets here Oct. 15-18.

The group, originated within the Air Force, is supported by the National Bureau of Standards (NBS), primarily to help government agencies, but sessions at Cpeug 79 will be open to people both in and out of government, according to conference Chairman Harry J. Mason Jr. of the General Accounting Office.

The registration fee is set low — $50, including proceedings — to encourage attendance, but space for meetings at the Royal Quality Inn of Point Loma is limited, so early registration is advisable, Mason noted.

After Denning's keynote address and the Morris panel discussion, the technical program will be divided into two major sections. The first, with sessions on installation management, computer system acquisition and CPE in auditing, focuses on the application of CPE to management concerns.

The second section, with sessions devoted to quantitative methods, CPE tools and experiences and data analysis, focuses on the technical discipline, according to program chairman John J. Bongiovanni of the Air Force Data Services Center in the Pentagon.

A session on work load analysis

(Continued on Page 32)

# 'Ropes' Backs CICS Report Printing

CENTEREACH, N.Y. — Many CICS installations need to print reports generated by both on-line and batch applications at a central site and at distributed locations. The Remote On-Line Print Executive System (Ropes) software provides just such support, according to its vendor, Axios, Inc.

The need is easy to recognize but hard to fill, a spokesman said. The complexities of controlling the remote printers as well as the cost and scarcity of the skilled personnel needed to write the systems can cause the delay or abandonment of many projects, he observed.

On the other hand, Ropes provides a set of capabilities that enable multiple applications to place report data on a Ropes print queue concurrent with on-line printing operations, he claimed.

A comprehensive and unified command structure allows effective control of Ropes by any authorized terminal operator; dedicated control terminals are not required, the spokesman emphasized. Application interfaces are provided to cut the programming effort needed to get a remote printing application "on the air."

Even after a system profile has been established with default options, the operator can interact with the software to route reports to a different printer if the usual printer, for example, is being repaired. Printers can be dynamically started, stopped, forward- and back-spaced, interrupted, tested and send forms alignment messages.

Reports can be held, released, restarted, canceled or transferred between printers. The same report can be sent to multiple printers, the spokesman said. The first terminal that issues an appropriate command becomes the control unit of a given printer, unless control is assigned to a particular terminal.

Determination of the control terminal is significant, he explained, because diagnostic messages for a printer are sent to its control terminal. However, the terminal may be used for any other purpose and need not be dedicated to Ropes.

Ropes is available for $8,000 or $245/mo for DOS/VS sites and for $10,000 or $295/mo for OS/VS shops, Axios reported from 2364 Middle Country Road, Centereach, N.Y. 11720.

# AM-100 Gets Inventory Applications

KANSAS CITY, Mo. — Inventory control and bill-of-materials processing are usually considered applications that require large-scale DP equipment, but The Computer Workshop of Kansas City, Inc. recently announced it has implemented them on the Alpha Microsystems, Inc. AM-100 microcomputer.

The Workshop package enables the user to control inventory by various methods ranging from simple requisition and receipt transactions to more elaborate operations that reflect purchase orders, requests from customers and production orders, a spokesman said.

Because the AM-100 is a multiuser time-sharing system, the software allows a manufacturer to have up-to-the-minute information on quantities on hand and on order as well as on costs, usage and commitments on each inventory item, he added.

The bill-of-materials portion of the packages handles the planning side of the manufacturing operation. It maintains a list or "bill" of all components and the quantities that are to be used to manufacture end items. Because subassemblies may have their own component lists, the system was designed to accommodate nested "bills."

The "explosions" of these bills of materials let the user determine the total cost as well as the availability of all the components that make up the end product. The "bills" are available on the CRT screen or in hard-copy form with a variety of formats.

Written in Alpha-Basic, the software will run on any AM-100-based system with enough mass storage for the inventory and bills involved.

While the Workshop can provide a turnkey hardware/software combination, it can also supply the software alone to current AM-100 users for $4,000. The Workshop is at 4027 N. Oak Trafficway, Kansas City, Mo. 64116.

## Directory Seeks Vendors

NEW YORK — Users can look forward to seeing a U.S. edition of the "International Directory of Software" early next year, but vendors have only until the end of this month to be sure their products are included, according to a spokesman for CUYB Publications, Inc.

Other editions of the book, already available in a number of countries, use a simplified and apparently standardized product-entry format with cross-indexed listings of products by primary secondary function and hardware compatibility, as well as an alphabetical listing by full names and acronyms.

The spokesman was unable to say exactly when the forthcoming edition will be available or how much it will cost. He said the only reason for saying anything about it now was to make sure vendors were aware of the book and of the opportunity to be listed.

Vendors who have not been in contact with CUYB and want to be in the U.S. edition should call or write the publisher this week at 633 Third Ave., New York, N.Y. 10017.

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# *Utility Programs Unveiled For IBM Series/1*

ORINDA, Calif. — A pair of utility programs for the IBM Series/1 minicomputer are now available from Legler Systems Co. for improving application program development and maintenance activities, according to a spokesman.

The EDXref program prints a sorted cross-reference dictionary of data names and labels used in source programs supported by the Event Driven Executive (EDX).

### The Same Source

The source programs processed by EDXref are the same as those used by other EDX utilities such as $EDITIN, which is used for source statement editing, he said.

The EDX Dump program prints the contents of any disk or diskette record, and the output can be in either a character or hexadecimal format, at the user's discretion. The user can select a specific record or a group of records for listing, and the printout can be directed to the terminal or system printer.

Each program runs in a 16K-byte partition on a Series/1 processor controlled by EDX and equipped with a CRT terminal and, if desired, a system printer. Shipped on diskette, each costs $95 and can be ordered from the vendor at 23 Charles Hill Road, Orinda, Calif. 94563.

# BGS Enhances 'Best/1' With Analysis Algorithms

WALTHAM, Mass. — The Best/1 package, which enables OS/MVS sites to simulate and therefore analyze possible configuration or work load changes, has gained both additional analysis algorithms and improved performance, according to the vendor, BGS Systems, Inc.

Capabilities added to Release 5.0 include routines to evaluate I/O subsystem contention, variability in maximum multiprogramming levels and variability in transaction processing times within shared domains. A fourth algorithm added to Best/1 analyzes average queue lengths for variable length servers, a spokesman said.

The I/O subsystem contention algorithm enables the user to evaluate both SIO and RPS reconnect delays at channels, control units and heads of strings, he said. This means Best/1 can now be used to cost-effectively optimize the selection and use of I/O channels, control units and heads of strings.

Study of the variability in multiprogramming levels should lead to more accurate models of Time Sharing Option (TSO) operations under variable loads. Gaining an understanding of variability in transaction processing times should let the user optimize IMS message processing regions, BGS said.

That optimization could prevent large transactions from overshadowing short ones, the spokesman explained.

Grouped together loosely as performance improvements are faster internal algorithms, availability of multiple model sizes, improved user dialog and editing diagnostics and broadened reporting facilities. Best/1 now supports, for example, modeling of as many as 200 servers and 15 workloads or 300 servers with up to 20 workloads.

Release 5.0 of Best/1 is available for $19,000 from BGS at 470 Totten Pond Road, Waltham, Mass. 02154.

# Impact of DDP To Be Explored

*(Continued from Page 31)*

and capacity planning, to be held Tuesday afternoon, Oct. 16, under the chairmanship of Jeffrey Mohr of Performance Sciences, Inc., forms a bridge between the two sections of the main technical program, Bongiovanni noted.

Another highlight of the program will be a panel discussion on the "corporate view of CPE." In this part of the program, corporate-level managers — both in and out of government — will discuss their needs and the adequacy of CPE in meeting those needs, he added.

As in previous Cpeug conferences, a second track will be devoted to tutorials and case studies on many aspects of CPE. Included in this track will be a workshop on standard performance measures in which participants will discuss the performance metrics that are, or should be, common across a wide range of computer systems.

### Great Expectations

The results of this workshop, which is scheduled to take up much of Thursday, Oct. 18, are likely to affect the use of CPE throughout the federal government and, depending on how successful that is, throughout the general DP community.

Special rates are available at the conference hotel if reservations are made before Oct. 1 and Cpeug is mentioned. The Royal Quality Inn is at 4875 N. Harbor Drive, San Diego, Calif. 92106.

Checks for $50, made out to Cpeug, can be sent to Lt. Margaret A. Maulin, USN, Department of Defense Computer Institute, Building 175, Washington Navy Yard, Washington, D.C. 20374.

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# DP Dialogue

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Notes and observations from the IBM Data Processing Division that may prove of interest to DP professionals

## You Ate 0.459 Gram of Phenylalanine Yesterday

Health professionals at Louisiana State University can determine the exact amount of each of 100 different nutrients in any list of foods, with the help of a computer. For example, a hospital dietitian can submit a series of planned menus, and receive back a complete analysis of the number of calories, the quantity of fat, carbohydrate, protein, and other nutrients from Vitamin A to phenylalanine (one of the amino acids).

Conventionally, a dietitian does such analyses with a desk calculator and a reference table. If one item of a menu is changed – say, a peach is substituted for a pear in a dessert – the entire list must be recalculated.

The nutrition data base at LSU is also very useful in studying the relationship between diet and disease, explains Dr. Prentiss E. Schilling, head of the department of Experimental Statistics at the university's Baton Rouge campus. "We can enter a person's food intake for 24 hours – items and quantities – and receive back a calorie count and the quantity of each nutrient," he says.

"In one project, a study of atherosclerosis, the researchers are measuring plaque formation in the coronary arteries of individuals, and comparing it to their eating histories by recording all food prepared in each subject's home for one month. Then the system converts each history into a complete nutritional profile."

The nutrition data base is maintained by the International Dietary Information Foundation, Dr. Schilling notes, which collects its information from laboratories in the food industry as well as government and academic sources. Currently stored in the university's IBM 3033 Processor is the complete analysis of over 3,000 basic foods and recipes.

"Our system is very useful to the food industry," Dr. Schilling points out. "Frequently, a processor must reformulate a product, as ingredients become available – substituting, say, palm oil for soy oil in baked goods. And this significantly changes the nutritional analysis. We enter the revised recipe and receive back a printout of a complete table of nutrients, with the quantity of each constituent stated in the appropriate unit of measure. This provides the basis of the nutritional labeling most packaged foods are required by law to carry."

*Under the direction of Dr. Prentiss E. Schilling, a data base in an IBM computer at Louisiana State University keeps track of the proportion of every known nutrient in more than 3,000 foods.*

## ACP Makes the Transactions Fly for Eastern Airlines

"Over 6,000 terminals are online to this computer, generating 5.6 million transactions a day," says Howard Hall of Eastern Airlines. "It often processes 155 high-speed messages per *second* – which would swamp a standard operating system. We need high-performance software and in ACP we have it."

The Airlines Control Program (ACP) is designed for IBM systems with many terminals and a high volume of transaction processing. In addition to airline reservation systems, some applications of that kind are hotel reservations, credit authorization, car rental reservations, police car dispatching, electronic funds transfer, teller memo posting, message switching, and loan payment processing.

At Eastern, agents can ask for a display of flight schedule information, seat availability, an existing passenger name file, or fare data, Hall explains. They can make reservations or change existing ones. And the system automatically computes the fare for 85 percent of the tickets issued.

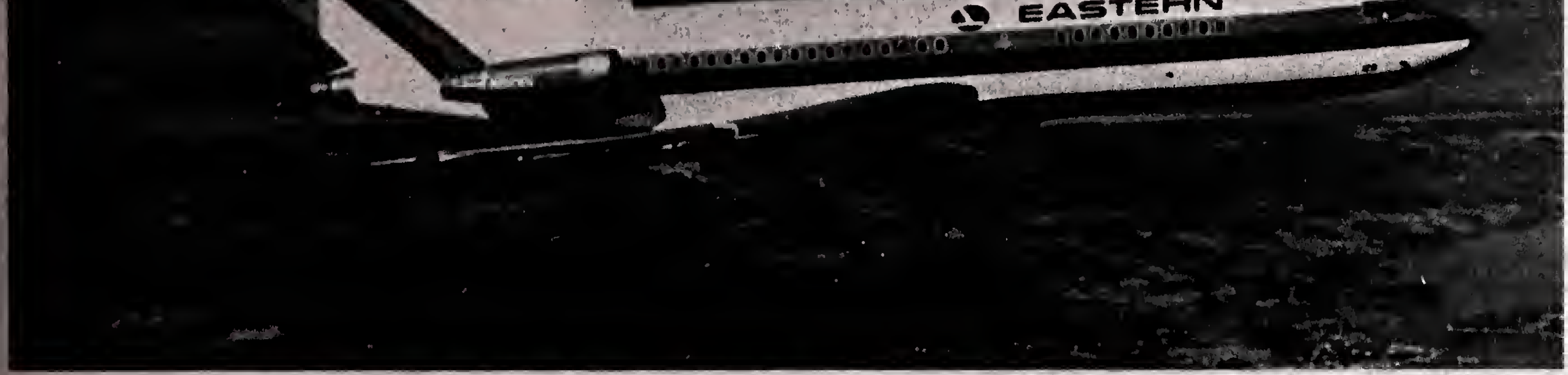
System One, as Eastern calls its ACP system, also supports seat selection, boarding control, and automated ticketing at more than 100 airports, as well as flight plan calculations and a number of secondary services. Hall is director of System One, which utilizes IBM 3033 Processors in Eastern's Doral Computer Center near its corporate office in Miami, and serves 11 regional reservation centers.

"We respond to 240,000 phone calls on an average day," he notes. "So we need fast response at the terminal even at the busiest times. When ACP is running at its capacity of 185 messages a second, it still responds within two to three seconds. Of course, it is much faster than that in normal periods. And bear in mind that there are an average of 10 or 11 DASD accesses per message."

Transactions enter System One in random sequence, with many terminals competing at once for service at peak times. ACP incorporates special concepts of system control to meet these extraordinary requirements.

"Reliability is as vital as performance," Hall adds. "Much of our systemwide operation would grind to a halt without the computer. Our availability averages 99.7 percent, outside the 10 minutes a day of downtime we schedule for maintenance. And we can switch to our backup 3033 Processor in two minutes or less.

"Without ACP, System One could not possibly meet our standards of performance and reliability."



*Eastern Airlines serves 104 cities in 14 countries. The Airlines Control Program (ACP) enables an IBM 3033 Processor in Eastern's reservation system to handle 5.6 million transactions a day.*

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## *Training in the '80s — Part 2*

# Money, Urge to Sample Affect Turnover

**By Robert J. Bond**
Special to CW

*In this article, the second of a two-part series, Bond, manager of the Boston office of Romac & Associates, personnel consultants, discusses the psychological makeup of the DP professional, his needs and goals. Part 1 provided a basic picture of training and its place in the DP scene of the next decade.*

An improved turnover rate is one possible benefit of a good training program, as was explained last week in Part 1. Thomas J. Horrigan provided a case study that pointed in that direction the week before.

But it is important to recognize that turnover in itself is not necessarily a measure of the soundness of a DP department or its associated training entity. Many things contribute to a company's turnover experience.

Many of the people attracted to the computing professions have a very low threshold for boredom and, at least in the early stages of their careers, will remain with a company only during a highly innovative and developmental stage. Such a stage can be sustained for long periods by very few organizations.

In addition, some people simply have a "sampling" syndrome. They enter the business intending to learn at the feet of a variety of teachers. And certainly money contributes to turnover statistics. Given the current supply and demand situation, no company can set a remuneration strategy so shrewd as to thwart every avenue in a competitive matrix.

In fact, studies have shown that raising salaries simply to dampen a turnover trend can be counterproductive because it places "golden handcuffs" on people who would really rather be elsewhere. Productivity itself suffers, and any hypothetical measurement of the salary dollars per unit of work from employees who are both disgruntled and overpaid would be distorted indeed.

### Providing Opportunities

The important thing to remember is that the career goals of DP professionals are indeed many and varied — probably as numerous as the department head count. One would think thoughtful companies would have long ago discarded the rigid idea that one must progress only along certain paths to reach maturity in the field, but such mistakes are still being made.

The greatest contribution a truly effective training department can make to a company's DP department is to provide its members with the opportunity to take the professional avenues they want to take and, with their new skills, address problem areas in the organization that need addressing.

Many training functions have been set up by managers who climbed a specific path and think the greatest favor they can do for the junior employees is provide the exact steps (and in the exact sequence) they previously climbed. By doing unto others as they would have done unto them, they think they act well.

A wiser approach, however, would be to do unto others as they want to have done unto them. The training department serves the dual constituency of its parent organization and its student members; there is great wisdom in inquiring of *both* entities regarding needs and goals.

### Specific Elements

What specific elements will be sought by existing and prospective members of the department? The answers are easy because they go back to the fundamental avenues and uses including data base and data communication concepts and implementation, distributed processing networks, on-line programming, structured design and programming and project management techniques.

Once again, in terms of motivating that subgroup of individuals capable of being motivated to stay with the organization, the reassuring message that they will be involved eventually is sufficient.

In constructing the elements of a

*(Continued on Page 38)*

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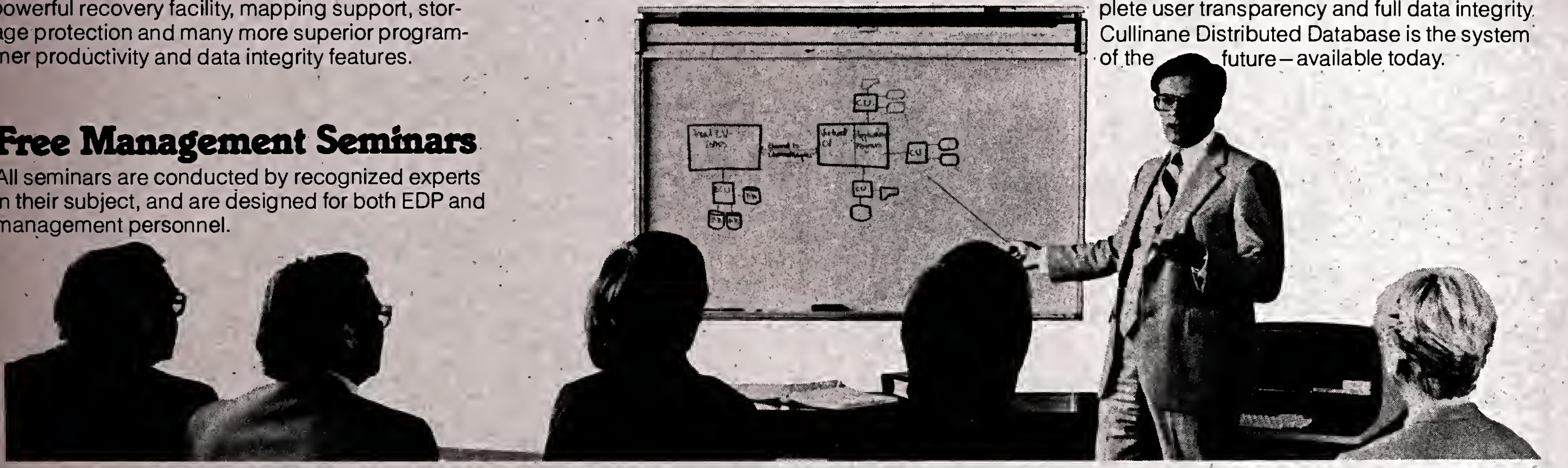

## Dates and Cities

**October**
9 Amarillo, TX
9 Dayton, OH
9 Kansas City, MO
9 Quebec City, QUE
9 San Jose, CA
9 Tallahassee, FL
9 Washington, DC
11 Detroit, MI
11 Orlando, FL
11 San Antonio, TX
16 Altoona, PA
16 Milwaukee, WI
16 Mobile, AL
16 Oklahoma, OK
17 Erie, PA
18 Greenville, SC
18 Los Angeles, CA
23 Evansville, IN
23 Hartford, CT
25 Harrisburg, PA
25 London, ONT
25 Portland, OR
30 Columbus, OH

**November**
1 Piscataway, NJ
6 Bridgeport, CT
6 Hamilton, ONT
6 Seattle, WA
7 Ottawa, ONT
8 Austin, TX
8 Toledo, OH
8 Westbury, NY
13 Buffalo, NY
13 Ft. Lauderdale, FL
13 St. Louis, MO
13 Tulsa, OK
14 Chicago, IL
15 Albany, NY
15 Phoenix, AZ
15 Pittsburgh, PA
15 Richmond, VA
15 Shreveport, LA
20 Indianapolis, IN
27 Rochester, NY
27 San Francisco, CA
28 Baltimore, MD
29 San Diego, CA

**December**
4 Ann Arbor, MI
4 Minneapolis, MN
4 Saddlebrook, NJ
5 Boston, MA
6 Ft. Worth, TX
6 Salt Lake City, UT
11 Cleveland, OH
11 Nashville, TN
13 Charlotte, NC
13 Newport Beach, CA
18 Cincinnati, OH

**January**
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8 Portland, OR
8 St. Louis, MO
10 Dallas, TX

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## *User Involvement Stressed*

# Software Integrates GTE Production Operation

NEEDHAM, Mass. — "Twenty-nine independent computer systems, each with its own programs, data files and reporting mechanism, do not lend themselves to an integrated operation consistently reflecting the status and locations of materials and products."

That excerpt from a GTE Sylvania management report summarizes one problem faced by the Eastern Division of GTE's Communications Products Business in 1976. The problem manifested itself in several areas. Proposal and prerelease bills of materials (BOM) were not tracked; the BOM system was not used uniformly or effectively; manual filing and hand transactions were causing multiple errors; and the batch environment at times encouraged the generation of inaccurate information as a result of the delay between requests and output.

In 1976, therefore, GTE launched a project to create a system that would lend itself to an integrated operation that reflected the status and location of materials and products.

The objectives of the system, called the Material Information Data System (Midas) were:

- To reduce the cycle time required to design and build a new product.
- To increase accuracy and minimize redundancies through the use of data base concepts.
- To go on-line in all departments for maintenance, changes, deletions, updates and so on.
- To provide the capability for ad hoc inquiries.
- To allow user involvement.

After a thorough evaluation, GTE selected the System 2000 from MRI Systems Corp. and installed it on its IBM 370/158, believing that MRI significantly emphasized user involvement in a data base management system (DBMS) implementation.

GTE also stressed user involvement. Throughout the Midas project, GTE users were, and continue to be, involved: they manage the Midas program; they develop the user manuals in their entirety; they conduct all training sessions; and they have extensive input on all program operations. Users quickly begin to use and appreciate the System 2000's English-like language and ad hoc inquiry capabilities.

### Five Applications Areas

Midas consists of five application areas, each individually cost-justified. These areas are engineering data control BOM; material control; material procurement; manufacturing operations planning and control; and material requirement planning.

"The savings in the material control application could save GTE enough money to almost pay for the entire program," according to Mark Dane, Midas program manager.

The engineering data control system was implemented in May 1978. By August 1978, the company was conducting 15,000 transactions a month. By February 1978, the number of transactions had tripled.

The response times for the month of March were between zero and five seconds for 81% of the transactions and between zero and 10 sec for 91% of the transactions. (The average transaction involves more than one data base.) Before the System 2000 was implemented, the response for such requests was measured in days or even weeks.

The ability of the System 2000 to provide quick on-line access to Midas has been one of GTE's greatest assets. The batch world sometimes 'lies,' not reflecting the correct status of the parts. In GTE's on-line world, however, the user knows immediately if the part he orders causes negative balance in the inventory.

### Material Control

In addition, an on-line system offers tremendous benefits to the material control application. Before Midas, nearly five million hand transactions a month took place in the stockroom. Even with an error rate of only 1%, the number of problems was astronomical. With Midas, an employee can request a certain part at a CRT. The system checks the validity of the account number and the department, determines whether the stock level is great enough to satisfy the request and prints out an order form in the stockroom.

Once the order is received in the stockroom, specific stock location information also becomes available. The stockroom can keep the order in the system until the stock clerks are ready to fill it, eliminating paperwork, filing and multiple handling of orders.

The system maintains a record of the last time each part was acted on or pulled, providing a handy index of part life usefulness.

### Generating Contracts, Proposals

Another benefit Midas provides is the abilty to generate a contract or proposal in record time. This is extemely important to GTE, because 90% of its business involves meeting strict government deadlines.

To generate a proposal, a user can command Midas to copy existing product descriptions that might define new products. Once all the components and materials are in the proposal

*(Continued on Page 38)*

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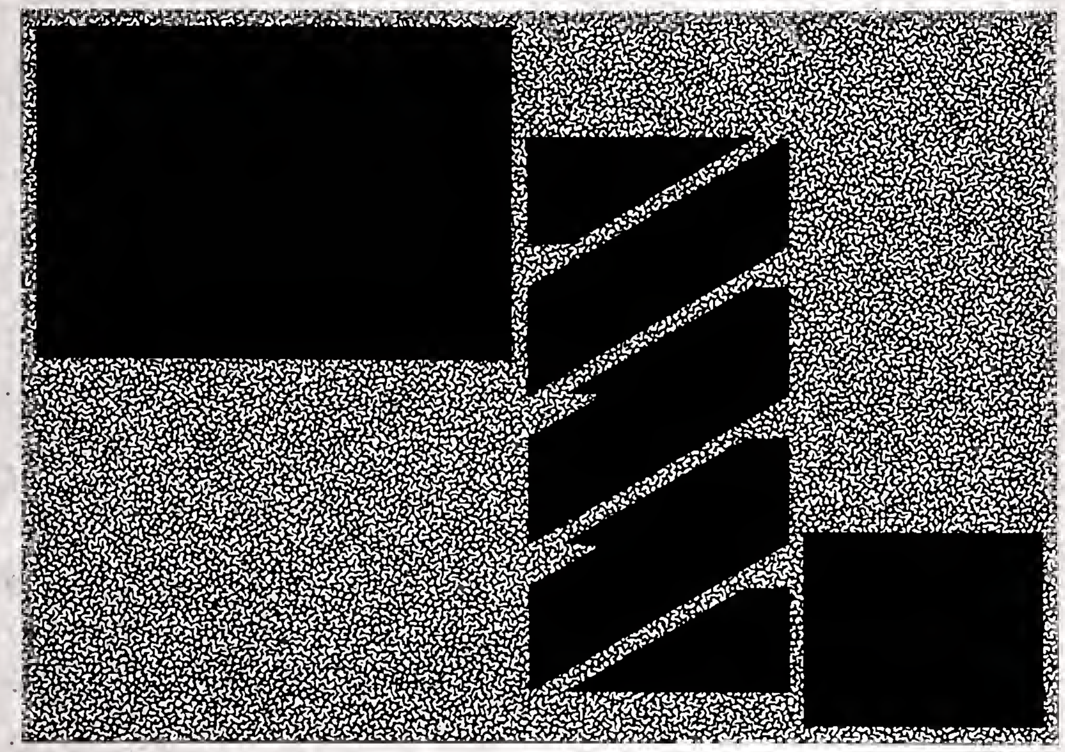
# IBM SAYS 3270s HAVE TO BE POLLED.



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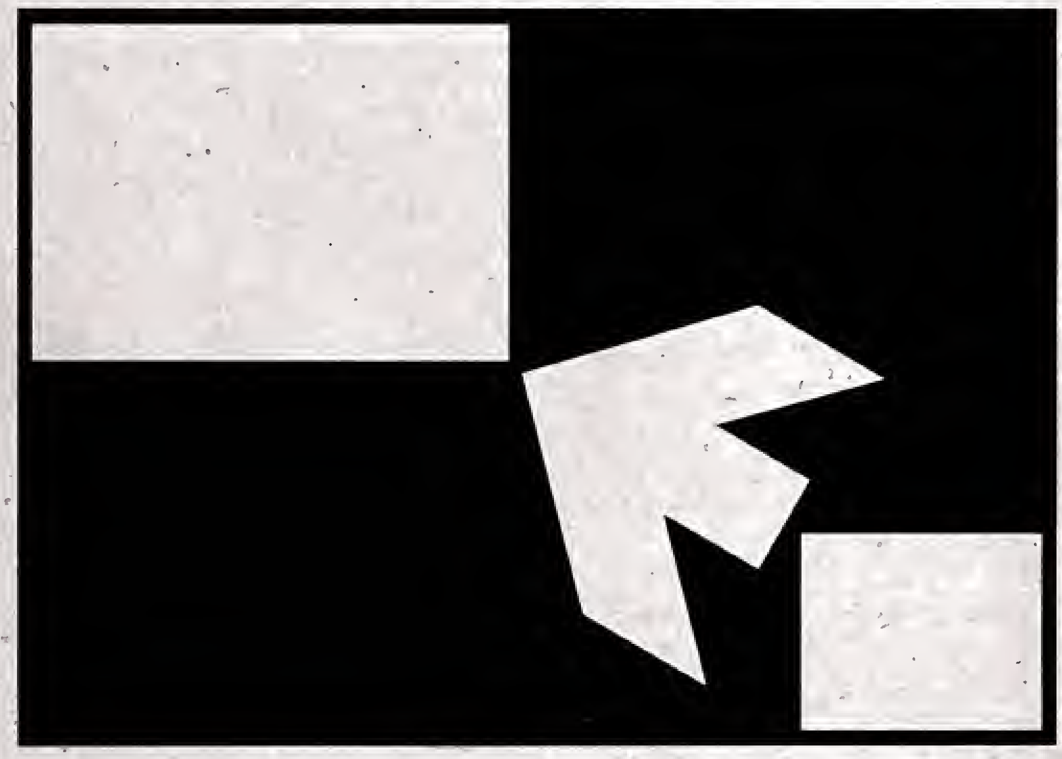

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# Urge to Sample Seen Motivating DP Employees

*(Continued from Page 34)*

good training program within the constraints of budget and space, attention should be given to the full variety of offerings. These include formal internal classroom instruction, attendance at vendor courses, individualized instruction through video and computer-aided instruction packages and tuition reimbursement.

It is important also to include a study of formal on-the-job training (OJT) and team concepts. This kind of learning and training occurs in many organizations, but too few recognize and measure it. There can be real value in the formal logging of OJT episodes, both in terms of measuring employee progress and, perhaps more important, by reassuring and reminding the participants that the training investment is continually being made.

One final aspect of the training function in an organization is one personnel consultants understand with particular clarity. There is a marketplace dynamic of the training investment, and these are the highlights. Total retention of the DP staff is unattainable and would not be a good thing even if it could be attained.

The kind of inquisitive and energetic individual attracted to our profession, often by moving from one company to another, provides a pollinizing of ideas that could not be achieved without such transfers. The best approach is to balance early training with reasonably swift acceleration in professional responsibility and remuneration.

We must also recognize that there is a merit badge syndrome in certain critical skill areas, and that even if balanced with salary reviews, the market will find ways of satisfying itself.

The crucial concept is this: the truly sophisticated organization accepts the fact that the overall atmosphere of a company making the training investment gains its measure of value through the inflight productivity of even those who learn and leave and through the stature gained from being the kind of place that provides the learning experience.

# GTE Operation Harmonized

*(Continued from Page 36)*

data base, the user can manipulate the data and, using various transactions, build up a completely new product. In this way, the time spent in the proposal cycle is cut dramatically.

Some of GTE's products contain nearly half a million components. Before the System 2000 was acquired, it took a long time to price and structure a bill, including labor and material costs for a product.

"In the past, we spent 90% of our time putting data into the system and 10% of our time analyzing the results," Dane explained. "With Midas, we've actually been able to produce a BOM in one day . . . and generate requisitions the next day.

"Because we're sharing a common data base, we're finding that personnel in manufacturing are able to build on what has already been done in engineering."

The System 2000 lessens the complexity of the Midas application by finding keys without splitting records, for example. The DBMS can find a number of keys in the directory without disturbing the user's view. Even when a key is added, the user continues to look at the same record.

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## *Especially for IBM 3270 Users*

# Controllers Today: A Step to the Future

**By Bill Riddick**
Special to CW

A new class of remote intelligent terminal controllers is helping increasing numbers of DP users to achieve the benefits of distributing computer intelligence without incurring the expense of remote programming or losing management control over applications.

Since technology made distributed information-handling systems possible, those systems have struggled to provide local managers with increasingly powerful local problem-solving capabilities. At the same time, distributed systems have had to satisfy central management's demands for economy and efficiency.

Distributed processing systems can pose some costly problems, however. Often remote programming personnel are required to create and maintain remote data processing operations, and sophisticated security schemes must be put into place to protect remote data from irresponsible or illegal manipulation.

These factors can prove burdensome to a company's central DP personnel, who are and should remain the organization's programmers and DP guardians.

Until recently, there was no easy migration path from centralized control to full distributed data processing. Users' choices were limited to expanding host-controlled, interactive IBM 3270-type telecommunications networks or upgrading entire centralized systems to full "distributed processing" status by installing minicomputer-based remote systems.

Remote mini-based systems were either expensive to buy and to program, as with the IBM 3790 and 8100 systems, or expensive to program, as with general-purpose systems.

### Best of Both Worlds

For many applications in such industries as insurance, manufacturing and government, intelligent remote terminal controllers can provide the best of both worlds for today and a painless migration path from centralized to distributed processing systems for tomorrow. The intelligent terminal controller can attach remotely to an IBM mainframe and can handle clusters of 3270-type terminals while saving remote operator time, communications line costs and reducing host processor involvement in remote I/O operations.

Multiple controllers can be attached to a central system's existing communication lines to greatly increase the network's number of field terminals without adding new communication lines.

Remote controllers can make important I/O decisions at the touch of an operator command key. Commands such as queuing requests for remote printing or storing and

*(Continued on Page 40)*

# Lisbon Bank Taking Giant Step To Multiprocessing Network

**By Julia Van Duyn**
Special to CW

LISBON — Banco Esperito Santo e Commercial de Lisboa (BESCL) is one of the largest banks in Portugal, with 35 branches in greater Lisbon and another 120 branches throughout the country. It is actively implementing an on-line multiprocessing network.

Considering the current state of transaction processing at BESCL, this is more than a large step — it's a giant leap forward to virtually total automation.

For now, a ledger card (visible record) is maintained for each customer at the appropriate branch. Every credit and debit transaction is recorded on the customer's card; each line on the card updates the customer's account. The actual recording is done by inserting the card into an accounting machine and keying in the data.

Every account is therefore updated "live," and the movement of cash flow is displayed "on-line." Besides recording transactions on the cards, these machines generate paper tapes that contain one record per transaction.

Prior to recording the transaction, however, the teller checks the customer's account. Each customer's signature and a summary of the account is on microfiche. Only if the signature and the type of account — such as a payroll, business or pension — check out will the teller key in the transaction, followed by the customer's identification.

At day's end, the tellers check their totals on the accounting machines. The paper tapes are then collected by the branch manager, balanced against the source documents and sent by in-house mail to the BESCL administrative computer center on Lisbon's Rua Castilho.

At the DP center, the data is transferred to magnetic tape and disk storage units. Later it is processed in batch mode on a 512K-byte Univac 90/70 mainframe running under VS/9.

In the current system, therefore, all account files are held centrally and updated on disks. Summary reports and monthly statements (extracts) are generated and mailed

*(Continued on Page 42)*

# *Modem Conforms to V.27*

MANSFIELD, Mass. — Codex Corp. has added to its LSI series family a modem that processes synchronous serial data at 4,800 bit/sec.

Conforming to CCITT V.27 bis and V.27 ter specifications, the LSI 48/V.27 modem can be used in either point-to-point or multipoint networks for communications over two- or four-wire leased lines or over two-wire dial-up networks. The modem reportedly features an automatic adaptive equalizer and a variety of system monitoring and fault isolation capabilities, including V.54 remote loopback and a low-speed V.23 secondary channel.

The LSI 48/V.27 can fall back to 2,400 bit/sec operation if necessary and employs 8-phase differential phase-shift keying (DPSK) or quadriga amplitude modulation (QAM) for primary signaling in the transmitter and receiver.

"Its narrow band modulation, combined with the digital automatic and adaptive equalizer, assures the lowest error rates possible — even when operating under the most detrimental conditions," Codex claimed.

The modem costs $4,585 or $125, $105 and $100 per month on one-, two- and three-year leases, respectively. Codex is at 20 Cabot Blvd., Mansfield, Mass. 02048.

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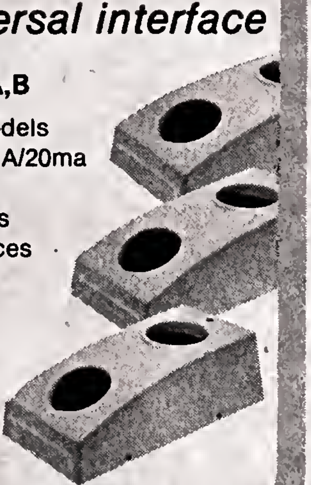

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# Terminal Controllers Offer Step to the Future

*(Continued from Page 39)*

then forwarding data would otherwise fall to the host mainframe or would have to be programmed into remote distributed general-purpose minicomputers.

Intelligent controllers like the recently introduced Telex Computer Products TC 371 that incorporate local format storage, local print and similar capabilities can significantly extend the effectiveness of their office managers without incurring a drain on central system resources. Such controllers provide an important alternative to total dependence on host communications on the one hand — the 3270 alternative — and full but costly distributed data base intelligence as represented by the 3790 or 8100.

An intelligent remote terminal controller can be expected to support binary synchronous or Synchronous Data Link Control (SDLC) line protocol while providing local printing queue functions, store-and-forward capability and the ability to store commonly used formats locally.

Also, a remote controller should allow batch printing and local editing functions, as well as supporting self-diagnostic routines.

Additionally, a remote controller should handle communications transmission rates up to 9,600 bit/sec and be powerful enough to support up to 32 interactive, 3270-type terminals, yet economical enough to be justifiable for as few as four devices.

Cost justification is easy for an intelligent terminal controller even if it is typically called on to perform just one or two of its repertoire of available functions:

- *Local print:* Local operators can print the contents of a terminal screen without host involvement. The feature reduces the "idle" time these operators normally spend waiting for the host mainframe to process a local print request.

With the intelligent controller, a locally installed printer is controlled by a local interactive CRT/keyboard terminal. The printer can operate under host control, under local control or be available to either.

Printers can be assigned to each terminal, if necessary, and individual operators can access the printer through depression of a single key. No host CPU modifications are necessary.

This can be an important time-saver in a print-heavy application, as for an insurance company. Such a company may employ several hundred printers, with three to five CRT operators assigned to each printer.

- *Store-and-forward plus editing capability:* After information is keyed at each remote terminal, the data may be stored on diskette prior to transmission to the central site. This backup data entry feature keeps operators productive even during mainframe or line failures.

The terminal operators utilize the local format storage capability to retrieve the required panel format. Data may then be entered in the designated fields and stored for subsequent transmission.

Without store-and-forward capability, inventory personnel might have to revert to writing orders manually while they wait for computer communications to be restored.

- *Local format storage:* The controller's ability to store display formats locally improves both operator and system efficiency. There is less operator idle time spent waiting for display of the required format; less line contention because format transmission traffic is reduced.

- *Batch print:* This allows the central processor to transmit data to remote sites overnight or at other times when traffic is lightest.

When routing batch-type report data to typical 3270 printers, the host CPU must send one 1,920-character page at a time and wait for the printer to finish printing before sending the next page. With the batch print feature, the user can "spool" report data to the controller's diskette file for subsequent printer output at the convenience of the cluster terminal operators.

This relieves the host CPU of much of the burden of dealing with the relatively slow print speeds of 3270 printers.

*Riddick is terminal products manager at Telex Computer Products in Tulsa, Okla.*

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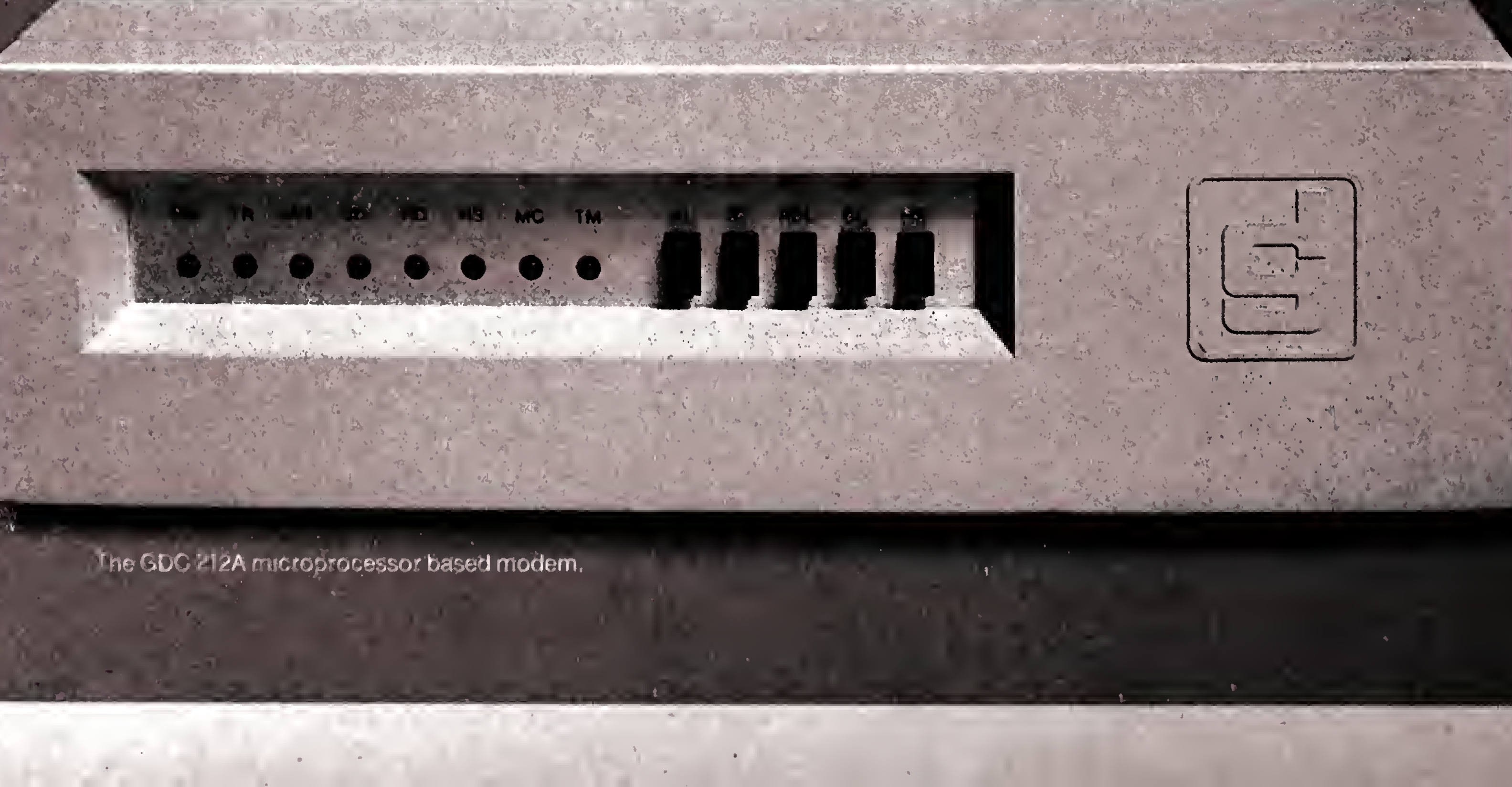

The GDC 212A microprocessor based modem.

# Software Allows Z80 Users To Transfer Data via Phone

CUPERTINO, Calif. — Zilog, Inc. has released an asynchronous communications software package that allows the user of any Zilog Z80-based microcomputer to transfer data to another Z80-based micro or to a mainframe via telephone lines.

The Asynch package runs under Zilog's RIO operating system and is aimed at small business users requiring a decentralized processing capability. With the software, a business' branch offices can collect accounting or inventory information independently and transfer it to a centrally located Z80-based microcomputer at the end of a designated time period, a spokesman said.

### Cuts CPU Throughput

Asynch can also reduce mainframe throughput and cost factors by allowing programmers to write, compile, debug and test programs using the Z80-based micro as a workstation, the spokesman continued.

The test programs would then be transferred as source code to the mainframe.

Zilog said Asynch was especially useful for transferring Cobol programs because every Z80-based microcomputer reportedly supports Level 1 Ansi Cobol.

### Two Modules

The package consists of two modules: an RIO hardware driver ($SIBDRIVER) and an asynchronous protocol terminal emulator (COMM). $SIBDRIVER is an RIO-compatible communications driver that permits the user to write software that can be shared with other computer systems, the spokesman explained. The module operates over an asynchronous serial port or by an auxiliary serial and parallel I/O board.

Using $SIBDRIVER as its interface, COMM enables an operator at the console of a Zilog microcomputer to access a host system or transfer data and high-level language source code files between disk storage and the host system. COMM can also transfer data from the host to a printer.

Asynch costs $500. Zilog is at 10460 Bubb Road, Cupertino, Calif. 95014.

# Burroughs Users Get Converter

CAMBRIDGE, Mass. — A protocol conversion processor that interfaces mainframe computers using the Burroughs Corp. Poll/Select protocol with asynchronous or bisynchronous equipment from other vendors has been introduced by Industrial Computer Controls, Inc. (ICC).

The CAIZ-SIU/BPS also allows IBM or other mainframe users to utilize Burroughs application equipment, such as bank teller terminals, with minimal software modification, the company said.

Transparent to the user, the CA12-SIU/BPS performs protocol conversion, data conversion and function transformation, providing "complete compatibility" between devices, ICC said.

The unit provides up to 30 ports and up to 32K bytes of buffer memory.

The base price of the CA12-SIU/BPS — with one Burroughs protocol port and one other protocol port — is $3,305 from ICC at 196 Broadway, Cambridge, Mass. 02139.

# Voice Data Switch Unveiled

PALO ALTO, Calif. — Prentice Corp. has introduced a voice data switch that allows any Prentice data modem registered by the Federal Communications Commission and designed for dial-up net use to be connected to the network by a standard business phone.

The VDS-100 switch is said to eliminate the need for Bell 502- or 503-type exclusion key telephone sets and to permit user selection of either normal telephone or data transmission operation with a direct line interface provided in the data transmission mode.

The VSD-100 costs $50 from Prentice at 795 San Antonio Road, Palo Alto, Calif. 94303.

# Remote Unit, Network Connected via Modem

SAN JOSE, Calif. — A Bell 103/113-compatible modem from Anderson Jacobson, Inc. (AJ) can reportedly connect a remote unit to a dial-up telephone network via three switch-selectable means.

The AJ 247 transmits and receives full-duplex asynchronous data at speeds up to 450 bit/sec and provides a dual terminal interface for either RS-232C or 20mA current loop terminals.

The quartz crystal-controlled transmitted circuit offers "extreme accuracy" over long periods of time and in spite of wide variations in ac line voltage and temperature, the vendor said.

The cost is $315 from AJ at 521 Charcot Ave., San Jose, Calif. 95131.

# Modem Operates Over 20 Miles

DANBURY, Conn. — A modem that functions over a limited distance — less than 20 miles — and does not require on-site equalization by factory representatives was offered here by Data-Control, Inc.

The Mc4800A operates at speeds up to 19.2K bit/sec over private lines or unloaded local telephone circuits. Half-duplex and full-duplex, point-to-point or multipoint and synchronous and asynchronous operation are standard.

Digital and analog loop-back switches and six LED status indicators are mounted on the front panel of the modem, which conforms to Bell 43401 specifications, the vendor said.

The Mc4800A can be ordered either in rack mounted or desk-top versions or as a single card. The freestanding desk model costs $650 from the vendor, a division of General Indicator Corp., P.O. Box 860, Commerce Drive, Danbury, Conn. 06810.

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# Lisbon Bank Phasing in Multiprocessing Net

*(Continued from Page 39)*

"semiautomatically" to the customers.

In on-line mode, the bank's staff of 12 programmer/analysts uses 10 Univac Uniscope 100 CRT terminals to query, retrieve, update and modify records for administrative purposes only. The DP staff is kept busy designing new reports and changing report formats and contents to keep up with the constantly changing government requirements. Only test data and live test files, rather than "real" files, are accessed by the staff.

BESCL's first CPU was a 1K-byte Univac 1004 plug-board processor, acquired in 1965. A 4K-byte Univac 1005 system followed in 1967.

In 1968, BESCL acquired a 32K-byte Univac 9300 tape system. Three years later it added a 128K-byte Univac 9400 OS4 disk/tape system. Next, a 512K-byte Univac 9700 disk/tape system was added in 1974, followed by the 90/70 under VS/9 in 1976.

The bank is reportedly pleased with the Univac hardware, software and service.

### Multiprocessing Network

Early in 1978 the bank decided to acquire a more sophisticated system to implement an on-line banking network in all 155 branches. It ordered a 1.5M-byte Univac 1100/12 multiprocessing system.

The design of BESCL's network commenced last October with heavy support from Univac system designers. The network features a centralized data base, redundant front-end message switching processors and internal banking CRT terminals. The programming language is PL/I.

Each branch will eventually have one programmable control unit (PCU) minicomputer, three to 10 administrative and teller terminals and a printer-validation logging device that produces two copies of all transactions. One copy stays inside this sealed device while the second, visible copy is used to check for possible local errors.

The PCU software will allow screen formatting, field checking and use of check digits and will maintain locally the totals of each teller and each branch.

The bank teller will enter all transactions in real-time. The PCU will check each transaction and, if the input data is valid, will send a compressed message of the data to the host CPU at the Lisbon administrative DP center.

The host CPU will process the transaction in real-time, update the Univac DMS 1100 data base (which meets specifications of the Codasyl Data Base Task Group) and send an acknowledgment to the teller's terminal. The terminal will remain locked until the host CPU replies with an average response time of three to four seconds.

### Three Phases

The project is being implemented in three phases:

- In Phase I, 35 branches in greater Lisbon — each equipped with six terminals and one PCU — will be on-line and operational by January.
- In Phase II, 20 branches in the vicinity of Oporto (Portugal's second largest city) will be added to the network with the same equipment as their Lisbon counterparts by October 1980.
- In Phase III, the rest of the branches will be added to the network in 1981. Administrative processing centers will be introduced throughout Portugal; each BESCL branch will have its own minicomputer or medium-size mainframe, comprising a distributed processing network.

### Security Measures

The network will be protected by the following security measures:

- Only the manager of each branch will have possession of the keys to the mechanical lock on the branch's PCU.
- The branch manager will maintain a list of valid passwords for that particular branch. The PCU will check the passwork as each bank teller logs on.
- The passwords and the teller's identification will be sent to the host computer with every transaction.
- The branch amount and the teller's totals will be verified regularly; so will branch totals and PCU totals. Host CPU totals will be checked against the branch totals.
- Each transaction will be recorded twice: once in the sealed validation printer at the branch and again in the transaction log file stored in the host CPU. There will thus be two audit trails.
- The amount of money handled by each teller will depend on his or her security level, which is implicit in the password structure.

*Van Duyn is an independent DP management consultant based in Loomis, Calif.*

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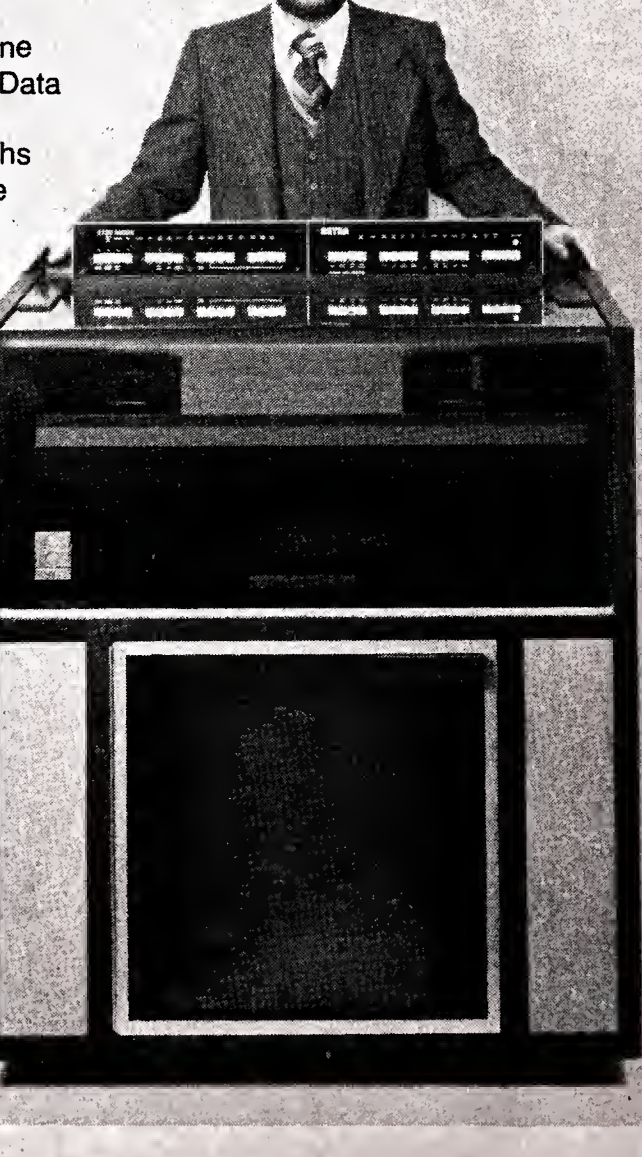

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## Insurer Saves By Eliminating Third Shift

**By Dennis Ambuehl**
Special to CW

GREELEY, Colo. — Moving up to a more technologically advanced computer system helped my firm, State Farm Insurance Companies, save money by cutting back from a three-shift to a two-shift DP operation.

Until February 1976, we ran three shifts a day, five days a week, on our IBM 360/30 and 360/40 mainframes. At that time, we replaced these two systems with an IBM 370/158.

Although we then had the CPU power to process jobs faster, the jobs had been set up in such a way that they required operator intervention.

Two factors enabled us to cut back by one shift: a change in some Job Control Language (JCL) statements so that jobs would use disks rather than the tapes and in-house development of a software package that established dependency relations between jobs.

We are one of 25 State Farm regional offices. With few exceptions, our JCL statements and programs are issued from corporate headquarters in Bloomington, Ill. Many programs issued by corporate headquarters used disk rather than tape for daily divisional and print run programs.

### Handling Tape Mounts

The difficulty with operator intervention was that third-shift operators had to handle tape mounts. Input for divisional runs is entered during the day and then, about 5 p.m., we start our nightly divisional run processing. Some of the steps in this processing include master records

*(Continued on Page 46)*

### *Part I*

## DDP: Recapping the Whys and Whens

**By A. L. Scherr**
Special to CW

*Distributed or decentralized data processing (DDP) seems to be the talk of the town these days. More and more vendors are introducing products labelled "distributed." But what do these terms really mean? What benefits can users find in DDP and what are its pitfalls?*

*This is the first of a four-part tutorial on the subject.*

While there is considerable debate, particularly among researchers and theoreticians (not to mention vendors), about the precise definitions of both decentralized and distributed (DDP), more and more organizations are conducting DP activities at several locations.

DDP is defined here as the implementation of a related set of programs across two or more DP centers, or nodes. The programs are related in that they share or pass data between them.

The key element in this definition is the communication between the programs. If two or more nodes are executing applications programs that do not communicate, then the overall system is an example of decentralized processing. (The term "decentralized DP" will be used to describe situations where the degree of communication is nonexistent or trivial.)

There can be a spectrum of degrees of communication among nodes, and at a certain threshold, the level of communication makes the factors to be discussed here important.

There are a variety of reasons for using distributed processing to implement a set of DP applications. Ultimately, they all offer economic advantages of one kind or another. However, values must be assigned to at least some of the factors in terms of the user's overall enterprise, not just in terms of optimizing DP.

Reliability and availability, organizational needs, costs, single-system capacity limitations and price/performance all enter the picture.

**Reliability and availability.** One reason for moving to DDP is to achieve better overall system availability. Two complementary approaches for achieving this are to limit the impact of failures by partitioning the workload among several processors and to reduce the impact of failures by providing redundancy.

Consider the case of *n* machines operating together and partitioned to particular sets of terminal users. In the event that one fails, the scope of failures can typically be limited to 1/nth of the terminal users. Of course, this statement is true only to the extent that the terminals on the operational machine can function without access to the data in the other machine.

Redundancy is provided when, in the event of failure of the centralized system or the communication facilities required to gain access to it, the front-end machine is programmed to perform essential functions; perhaps at a reduced level.

**Organizational needs.** DDP is often a means to manage computer use more effectively. As the classic centralized DP organization became large enough and critical enough, it required more structuring. Thus, some DP organizations are highly divisionalized. And recently, operational divisions or departments of many enterprises have established their own local DP ca-

*(Continued on Page 46)*

## Multicolor Digital Plotter From Soltec Makes Debut

SUN VALLEY, Calif. — An eight-color digital plotter from Soltec Corp. is said to have a maximum line-plotting speed of 30 cm/sec, with accuracy of .1% of full scale.

The Model 281 has a plotting area of 280 cm (Y-axis) by 360 mm (X-axis) and a maximum positioning speed of 100 cm/sec, according to the firm.

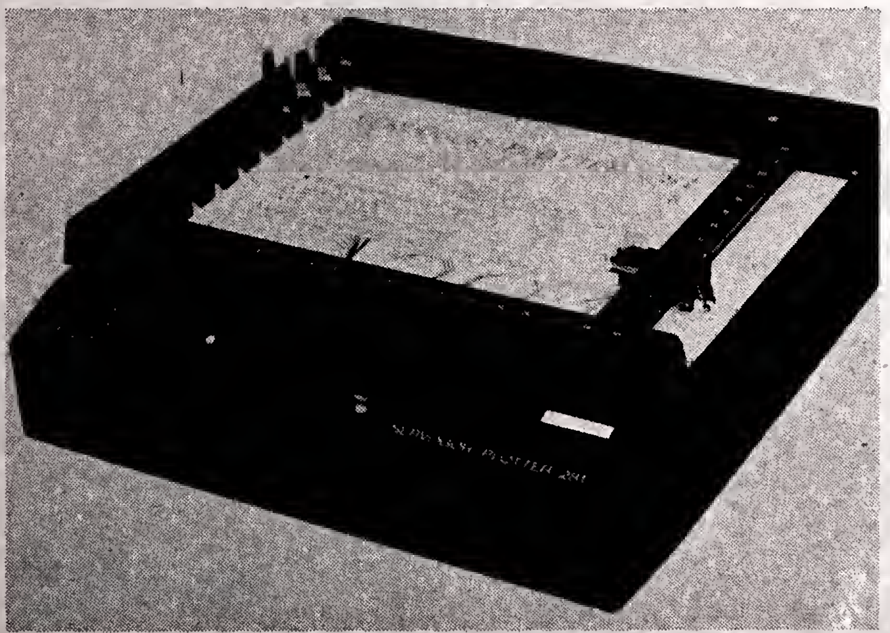
Available with RS-232, CCITT V.24 and 20 mA interfaces, the microprocessor-controlled unit is intended for both end users and OEMs.

Up to four Rotring-Isograph and four nylon-tip pens can be accommodated in the unit, which can be equipped with a 1K-byte input buffer.

Other features include a programmable pen select, off-scale data handling, absolute positioning and circle and arc generators. In addition, character plotting with any size, width, rotation and slant, programmable offsets, automatic pen lifts and automatic speed control are standard, Soltec said.

Options include a programmable paper advance, maximum 2K buffer and digitizing sight.

The basic price of the Model 281, with an interface specified by the customer, is $4,725, a spokesman said from 11684 Pendleton St., Sun Valley, Calif. 91352.



Soltec Model 281 Plotter

## Honeywell Users Schedule Forum on Large Systems

WASHINGTON, D.C. — The Honeywell, Inc. Large Systems Users Association (HLSUA) will hold its 29th forum at the Disneyland Hotel in Anaheim, Calif., Oct. 14-17, the group announced recently.

User presentations on the uses of Honeywell hardware and software, as well as updates on field engineering, support services, hardware and software are scheduled.

The meeting will consist of workshops, seminars and lectures on more than 75 topics, given by Honeywell large system users, invited guests and Honeywell representatives. The three-day program is organized by applications, installations, systems, languages, utility and Multics committees of the association.

Nearly 1,300 Honeywell large-scale computer users from around the world are expected to attend. Reservations and other information can be obtained from Gus Duda at Suite 858, 1030 15th St., N.W., Washington, D.C. 20005.

## *Speeds Return on Investment*

# Key-to-Disk System Pays for Itself in 19 Days

Special to CW

LOS ANGELES — Although the refrain "it paid for itself" is often heard in discussions about DP equipment, it is frequently mere hyperbole. But a key-to-disk check scanner and sorter system being used by the county of Los Angeles has helped the county do just that — and in a 19-day period, according to H.B. Alvord, the county's treasurer and tax collector.

The county government agency is the largest in the U.S., and the county treasurer and tax collector collect the amounts due on nearly two million parcels of land. The office is also responsible for the collection of all property taxes for cities, schools and other taxable agencies in Los Angeles County. The property tax charges for the 1977-1978 fiscal year was more than $3.6 billion.

To help reduce the property tax burden, the treasurer's office, like those in many cities, invests idle funds to maximize interest earnings. Doing that requires accurate, timely information.

### Two Major Deadlines

The two major tax delinquency deadlines each year are Dec. 10 and April 10. The office reaches peak operating capacity during the six weeks prior to and in the two weeks following those two dates.

"We run 24 hours a day for those weeks," Alvord said. "When we were looking for a system to speed the check processing procedure, it was important that it be able to handle the large volume during those times."

The county began looking for a computer system about two years ago. After detailing the requirements for the DP department and opening competitive bidding, the county selected a Cummins-Allison Corp. Series 4400 Keyscan system.

Included in the configuration was a 13-pocket reader/sorter, an 800 bit/in. tape drive, a 9.8M-byte disk drive, a 96K-byte CPU, three CRT keystations, a 600 line/min printer and a control station for the reader/sorter.

In addition, the system has a video insert feature to correct checks in real-time and a decimal arithmetic feature to increase the speed and capability of the software.

### Rewards in 19 Days

The system was installed in October 1977. During the 19-day period from Nov. 28 to Dec. 16, the county earned $148,000 in interest as a result of having a computer, according to Alvord.

"The system paid for itself and gave the taxpayers a substantial bonus in earned interest less than two months after it was installed," he said. During the first year of operation, the county earned an additional $313,000.

When checks come into the department, they are sorted and processed during the first shift for deposit later that day in the county's banks. The accompanying stubs are processed during the second and third shifts in peak tax season, and extra people are hired for additional shifts.

The system has other uses, too. For example, it processes all checks received for the payment of license fees, unsecured tax bills, late tax payments and other miscellaneous payments made to the tax collector's office.

"Before installing the system, tax payment checks were batched and sent to a bank clearinghouse for processing. This required three to five days, during which the county received no interest for the money," Alvord explained.

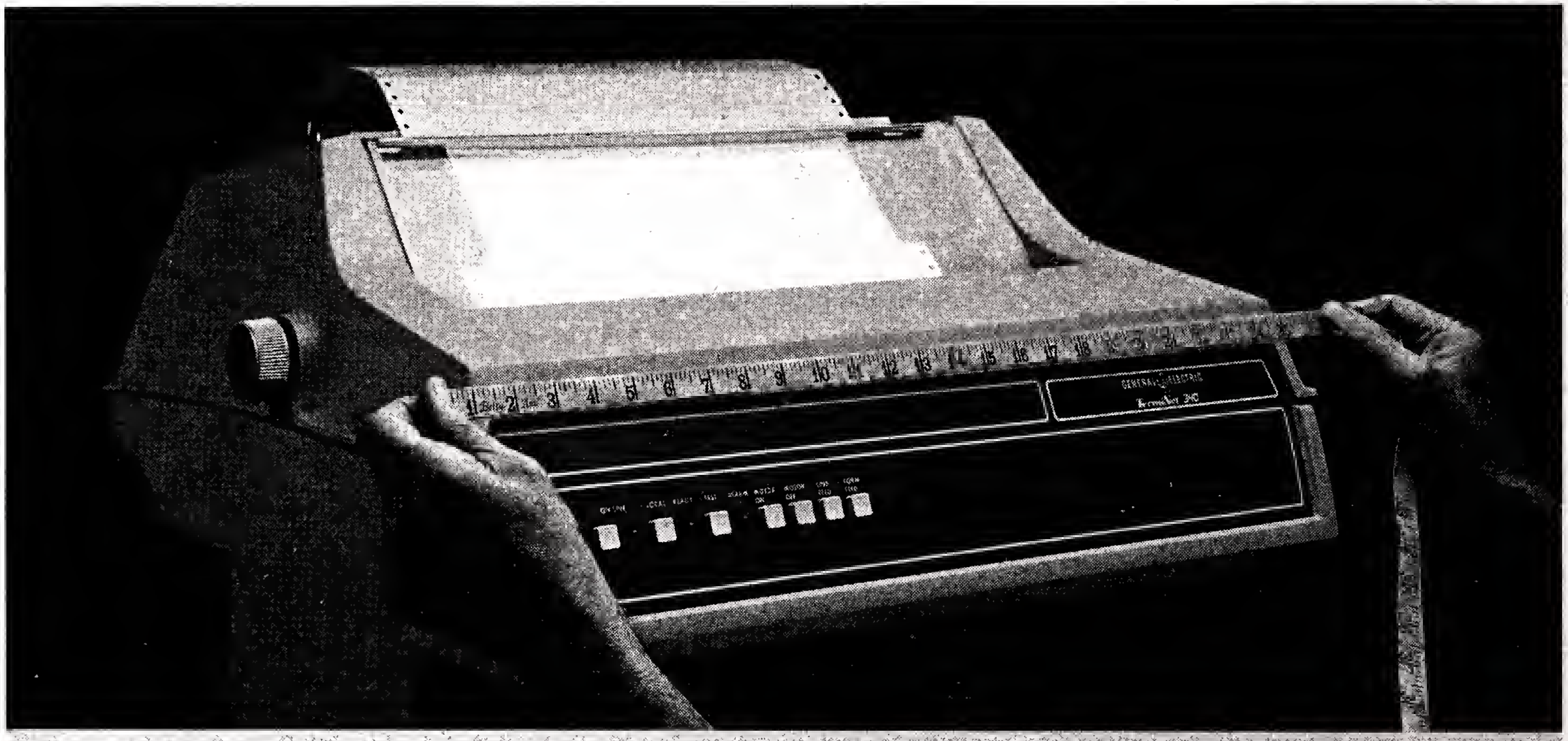
The county has already upgraded from the 4400 system to a 5400 processor in an attempt to increase processing speed, he said.

# Panel Unveiled For Fire Control

MONEE, Ill. — A fire control panel that operates with almost any Halon 1301 or carbon dioxide fire extinguishing system was recently introduced by the Chemetron Fire Systems Division of Allegheny Ludlum Industries.

With solid-state internal circuitry, the unit performs all functions required by the National Fire Protection Agency. The panel will continuously supervise circuit wiring and ac power supply for open circuits and ground faults in nine different areas, a Chemetron spokesman said.

The control panel for a cross-zone detection system costs $487, the vendor said from Rt 50 and Governors Highway, Monee, Ill. 60449.



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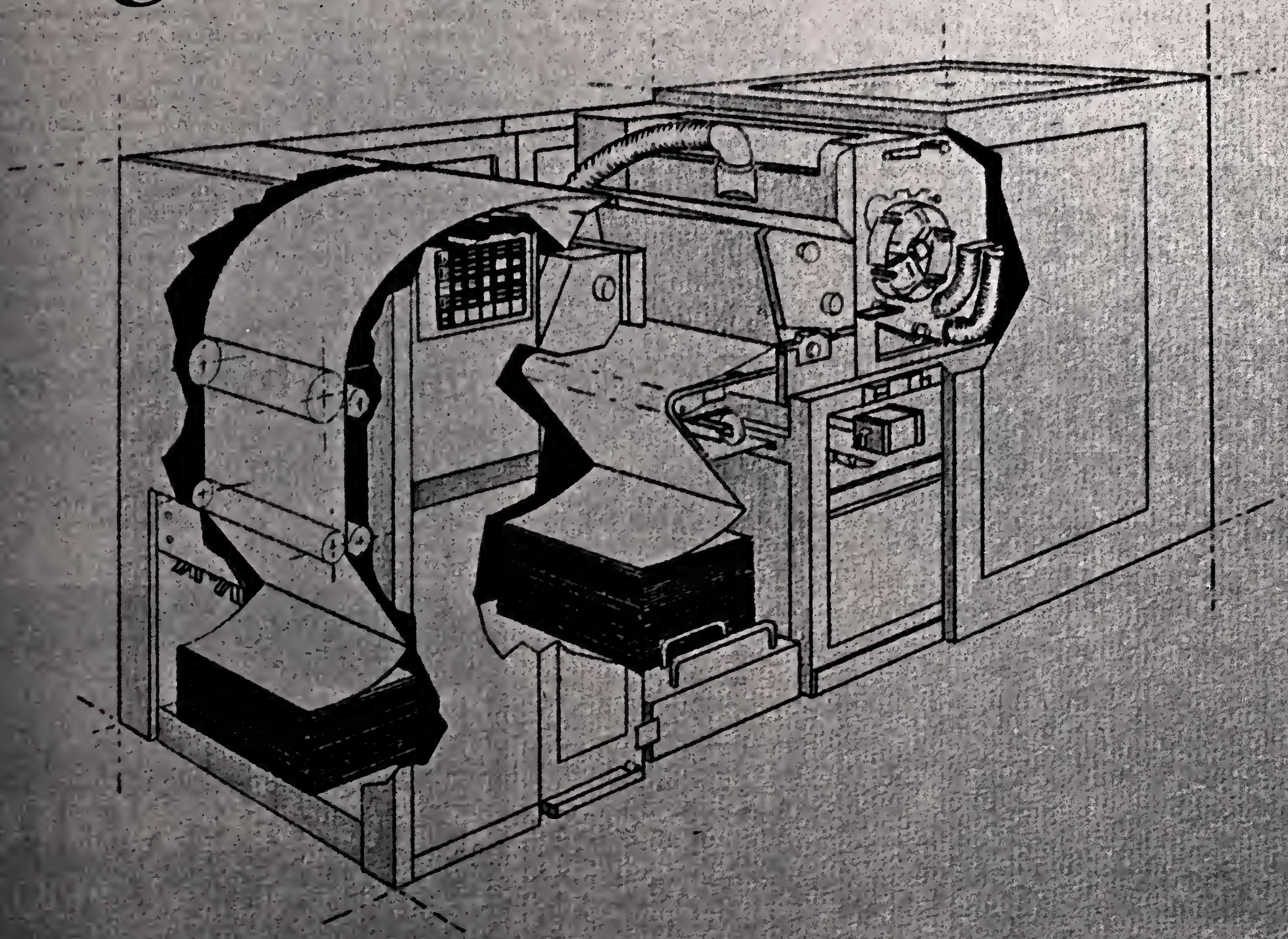

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# Insurer Trims Down Operations to Two Shifts

*(Continued from Page 43)*

updating, policy rating, print runs and statistical records building.

This processing usually takes approximately 12 hours, depending on the amount of input entered for that day. Once the processing is done, we start our printing on three IBM 1403 printers. Third-shift operators would have had to mount and dismount tapes to do the printing.

However, under the new system, data sets are built on disk, where they remain until the first-shift operators copy them to tape. This frees the disk space for the next night's processing.

The disk space we used was space normally used for disk sort and work files during the first two shifts, so we did not have to purchase any additional hardware.

### Network Scheduler

In conjunction with the JCL changes, we began using a software package, developed by one of our staff, called a network scheduler. This is a nifty software package that relies on a matrix of job dependencies.

When a job is completed successfully, the matrix shows what other jobs can be started.

We have one network that consists of 52 jobs for all our daily divisional runs, print programs and tape copy jobs.

When our second shift leaves at midnight, it puts a hold on the copy portion of the network. The divisional runs are not dependent on any of the copies. Thus, they continue to process on their own, unattended, through the night.

In fact, they are dependent only on the previous run. The network scheduler checks condition codes for each job, so if a job does not finish running successfully, the next job in the process will not start.

Several problems can occur during the night. A job might abend or go into a loop or the system might crash because a hardware failure or a power failure. In any case, if there is a problem, the system sits there until morning not working, which puts us behind on our printing.

When this happens, it not only puts us behind, but also throws the accounting department off schedule because it will get reports from us later than usual.

Not having a third shift has saved us quite a bit of money. It eliminated a third-shift differential for three or four people, even though it did not reduce the total number of operators. It also eliminated the need for a third-shift supervisor.

In addition, it has allowed us to have a larger number of operators on two shifts, rather than spreading them across three shifts. This has enabled us to handle vacations and sick leave better, and it works better in terms of allowing people to take job-related courses.

One other factor that can't be overlooked in our success is our operators. They are dedicated, hard workers, and without these qualities we could never have lasted so long with only two shifts.

*Ambuehl is DP supervisor in the Mountain States regional office of State Farm Insurance Companies.*

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# DDP: Recapping Whys, Whens

*(Continued from Page 43)*

pability.

**Communications costs.** By moving computing capability nearer the end user, both decentralized and distributed processing offer the potential for eliminating, or at least reducing, communications costs. Computing costs will continue to decrease faster than communications costs. For this reason, the move to distributed or decentralized processing will become easier and easier to justify for more and more applications.

**Single-system capacity limitations.** Another reason for moving toward DDP, or at least decentralized processing, is that a single computer system with adequate capacity is not available.

Another limitation arises from the operational complexity associated with ever-increasing workloads. As applications are added to a central system, the cost grows for migration to a larger capacity system and/or new operating systems software.

Partitioning the workload across two or more nodes can serve to reduce these problems and allow for more manageable growth.

**Price/performance.** By partitioning applications across several machines, it is often possible to use specialized minicomputers or microprocessors. Such machines can have price/performance advantages over a large, general-purpose system.

Moreover, the use of smaller, simpler machines in a distributed environment has several other advantages. For example, it is usually more economical to do a pilot version of an application, and there is finer granularity of growth increments.

Finally, smaller machines in the minicomputer or microprocessor categories have simpler software requirements.

*This article has been condensed from "Distributed Data Processing," which originally appeared in the IBM Systems Journal, Vol. 17, No. 4, 1978 and appears through the courtesy of that journal.*

*Scherr is manager of distributed systems programming with IBM's Systems Communications Division in Kingston, N.Y.*

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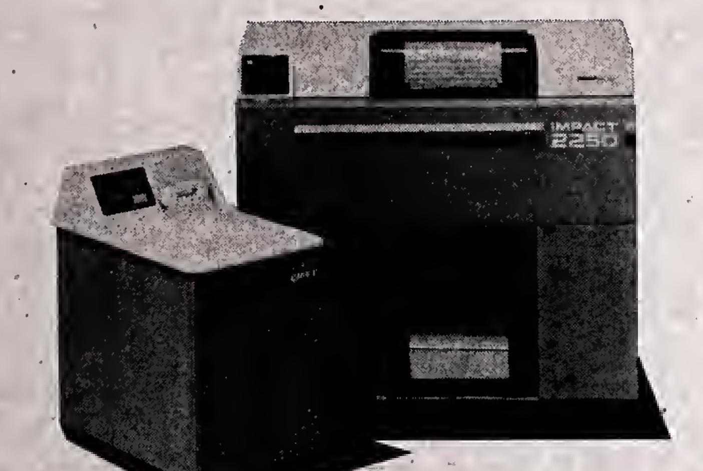

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# K-Mart Trades Cartridge for Winchester Disks

**By Jeffry Beeler**

CW West Coast Bureau

MONTEREY, Calif. — To trim its soaring service costs, a chain of discount department stores curtailed its maintenance costs by replacing its data concentrators' cartridge disk systems with Winchester-type units.

K-Mart Discount Stores, Inc. switched to the Winchester-style disk systems partly because they provided a reliability edge over the earlier equipment and partly because they proved easier to connect to the concentrators than the cartridge units.

In reconfiguring its concentrators, the store chain also had Cyber Data Corp., a systems house based here, establish two repair depots to maintain a reserve supply of the units — Shugart Associates SA 4004s. Now, when one of the concentrators' disk systems breaks down, K-Mart removes the defective unit and replaces it with a spare module from one of the repair depots, which are located here and in Toronto.

Before K-Mart reconfigured its equipment, a disk systems breakdown usually forced the store chain to summon a service representative — it used a third-party firm — to perform the tricky task of disconnecting the broken unit from its concentrator and attaching a replacement. But today, because of the ease with which the Winchester systems can be connected, stores can replace a malfunctioning disk unit without requesting outside help.

By servicing its disk systems with in-house personnel rather than third-party maintenance specialists, the store chain has reportedly cut its spiralling service costs.

### Nightly Polling

K-Mart implemented its do-it-yourself maintenance plan for its Canadian outlets, each of which operates a data concentrator linked to some 10 to 30 in-house point-of-sale terminals. Housed in the stores' back offices, the data concentrators consist of a Hewlett-Packard Co. (HP) 2649 terminal, a 14.5M-byte SA4004 disk system and a 180 char./sec printer.

Every night, the concentrators poll the terminals and relay the collected data through a Wats line to two 256K-byte IBM 360/40 processors in Toronto, the site of K-Mart's main computing facility.

In formulating K-Mart's new maintenance strategy, planners cited several reasons for scrapping the DM-448 cartridge disks from Ampex Corp. as the chief storage medium for the Canadian outlets' data concentrators. First, they said, cartridge disk units had proven excessively vulnerable in the past to heat-related equipment breakdowns. Because cartridge disk systems are not enclosed, they require built-in fans to continuously cleanse the units' read/write heads and media of dust and other contaminants.

Moreover, cartridge disk systems require large power supplies to support these fans, according to Cyber Data President Charles Lembo. During the summer, K-Mart found that the heat dissipated by the units' fans, their power supplies and other hardware modules produced excessively high ambient temperatures that stretched the units' recording media and thus caused misreads.

To make matters worse, most preventive maintenance had to be performed at night, when service calls cost twice as much as they do during the day.

Another reason that planners rejected cartridge disk systems as part of K-Mart's revised maintenance strategy was that the units often proved difficult for unskilled-personnel to connect to their host terminals, the HP 2649s. Because the disk systems' controllers and driver software were integrated in the host terminals, K-Mart had to connect the storage modules and the 2649s through 4-in. ribbon cables that incorporated some 50 data, timing, control and interface lines, according to Rodney Peterson, president of the Los Angeles-based Digital Sales Corp., Cyber Data's marketing and sales arm.

K-Mart discovered, however, that it needed specially trained maintenance personnel from the outside to install the ribbon cables correctly. Without these specialists, the store chain ran the risk of plugging in the connectors upside down, Peterson explained.

A third factor that made cartridge disk units unsuitable for K-Mart's new maintenance strategy was the modules' weight. Because of their associated fans and power supplies, a typical cartridge disk system weighs about 160 pounds, far too heavy to be easily replaceable by users.

### The Winchester Edge

Winchester-type disk units, by contrast, lack large integrated power supplies and, as enclosed systems, require no fans to sweep away airborne contaminants. As a result, the units weigh only about 60 pounds, even with their controllers, Lembo said.

In addition to making Winchester units relatively lightweight and easy to move, the absence of large integrated fans and power supplies allows the systems to dissipate only about half the heat of cartridge disk modules, Lembo added.

Thus, with a major cause of equipment overheating eliminated, Winchester-type units suffer fewer temperature-related reliability problems than their cartridge predecessors.

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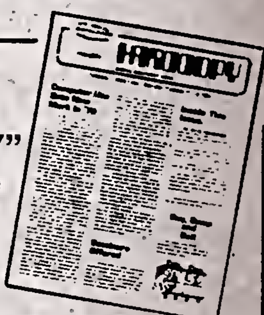

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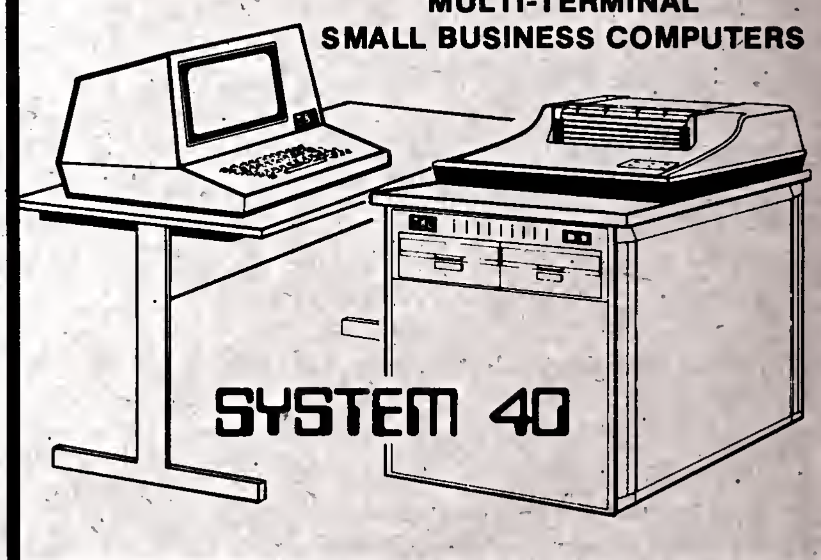

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### History of Misnomer Explored

# Minis Much More Than Name Implies

**By Jon R. David**
Special to CW

The most popular type of computer, and the one of interest to most businesses, is the minicomputer. However, the very name of these machines — specifically, the prefix "mini" — is considerably misleading. To realize just what a minicomputer is and what it can do, one should look at their evolution.

In the early to middle 1960s, several manufacturers, most of whom no longer exist, offered computers that were very powerful but came with a small word size, very little program development software and nothing resembling an operating system.

Eventually there were enough of these machines to be recognized as a class of computers, and the trade press referred to them as "small, systems-oriented" computers — "small" because they were physically small (relative to the mammoth machines offered by IBM, Control Data Corp. Univac and the like) and "systems-oriented" because they were so powerful.

These machines not only offered the same level of equipment technology as their larger counterparts, but they were also the first to introduce major technological advances: their manufacturers did not have large and costly software applecarts to upset by introducing drastic changes. These machines were every bit as powerful as the larger computers for most applications. They were just difficult to program because of the absence of sophisticated operating systems and higher level programming languages.

### Catchy Nomenclature

When the miniskirt came into prominence, the trade press started to refer to these small, systems-oriented computers as "minicomputers." It must be understood that the name was merely a catchy nomenclature applied by the trade press some 10 years ago. The machines themselves were still very powerful. Since the users of these machines were primarily technically oriented and knew what they were, the name misled nobody.

Computing machinery by itself is not much use beyond process control applications. To extend the minicomputer's use to areas such as business processing, it was necessary to interface disks, tapes, printers and other popular peripheral devices. Since the support equipment then available was that of the large computers, it was not uncommon to configure a minicomputer system where each piece of peripheral equipment cost more then the basic computer.

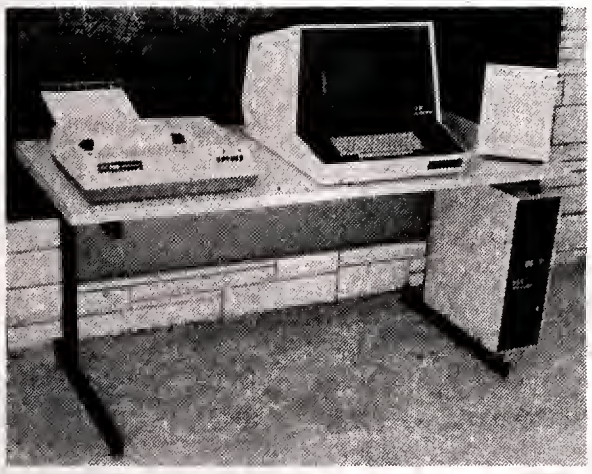
Within a few years technological advances brought the power of these minicomputers way up, while at the same time brought their price way down. This, however, did not greatly affect the price of configured systems.

By the early 1970s new classes of peripheral equipment came into being. Significant among these were high-speed character printers, tape cartridges and cassettes. Such devices, with much lower costs than their full-scale predecessors, enabled one to put together a minicomputer system at a price that would be of interest to smaller businesses.

Many small business concerns soon began obtaining minicomputer systems. However, these neophyte users discovered that the minimal programming tools offered by the

*(Continued on Page 54)*

# Pan-Energy's 'Girl Friday' Z80-Based, Has 48K RAM


**Pan-Energy Girl Friday**

HOUSTON — A Z80-microprocessor-based small business system with 48K of random-access memory and system software is available from Pan-Energy Corp.

Priced at $5,750, the "Girl Friday" Model B-20 features a removable antiglare screen with front panel brightness control, lighted "all caps" and "shift lock" keys and a numeric keypad for business applications, according to the firm.

The 12-in. CRT holds 24 lines of 80 characters, using an 8 by 10 dot matrix with upper/descending lower case Ascii characters, programmable normal and reverse video.

The Model B-20 also includes an industrial power supply, 18-slot S-100 motherboard for future expansion, serial and parallel I/O ports and software programmable for all serial and parallel interface techniques, according to the firm.

Also included with the system are two Micropolis Corp. disk drives and 630K bytes of disk storage.

System software included with the unit includes Micropolis Corp.'s disk operating system (MDOS), Micropolis Basic (MBasic) and CP/M. MBasic features renumbering, line editing, merging, program tracing, record-oriented disk I/O, precision up to 60 digits and chaining, the firm claimed.

Included is a system line editor to provide assistance in creating and maintaining assembly language source program files that are compatible with the MDOS 8080/8085/Z80 assembler. It may also be used as a limited general text editor.

Also included is an assembler for producing 8080/8085/Z80 object code from the source, the firm said.

As a system monitor, the extended monitor provides 23 commands for such functions as memory dumping, entering data into memory, testing memory, polling I/O ports and moving blocks of memory.

Use of these commands is said to provide all of the required console input and output for the system. Because the monitor is set up for the particular configuration of the system, all other 8080/8085/Z80 software will run on it without system-dependent modifications, Pan-Energy claimed.

Options include a 20M-byte hard disk system, a real-time board for multitasking and full utilization of the motherboard, analog board and 12-bit analog converters.

Additional software is available for programmers wishing to use Cobol, Fortran, Pascal, CBasic2 and other compilers and programs for operating under CP/M.

Pan-Energy is at 10210 Olentangy, Houston, Texas 77075.

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# Fixed-Disk System Works With DG-Type CPUs

ARVADA, Colo. — A fixed-disk emulating subsystem that interfaces with all Data General Corp. and DG-emulating CPUs has been announced by Mini Mag, Inc.

The Mini Mag DMAA is a self-contained, modular random-access disk emulating controller unit that reportedly gives bulk memory addressing capabilities beyond 64K bytes and speeds data transfers in existing operating systems.

The DMAA provides control, interface, timing and buffering of data between the CPU and expansion memory chassis such as those manufactured by Monolithic Systems Corp., Mostek Corp. and Intel Corp., Mini Mag said.

All transfers and controls are software-transparent to those of the DG 4019-equivalent fixed-disk subsystem, a spokesman added. The DMAA is compatible with the RDOS, Iris and Blis operating systems.

Communications between the controller and CPU is in 16-bit parallel format; there is no overhead in serial-to-parallel or parallel-to-serial data conversions as required in conventional disk subsystems, he claimed.

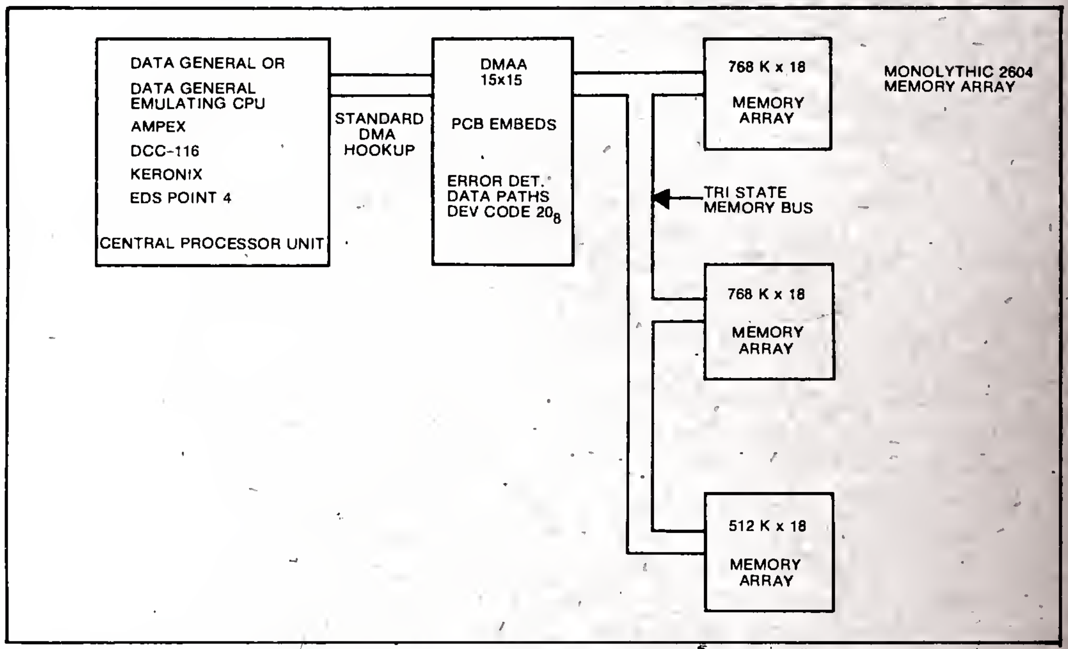
The CPU communications are on the 16-bit bidirectional I/O bus shared by each peripheral device attached to the bus. On CPU input operations, data flows from sequential memory array locations, staged in a buffer located on the DMAA and written into CPU memory via the data channel, the firm said.

Before a read or write operation can begin, specific commands must be transmitted to the DMAA by the CPU. Once this has taken place, data channel requests are sent by the DMAA at synchronized times for direct memory access and transfers occur automatically without further instruction from the CPU, the spokesman said.

Data is routed directly to or from CPU memory.

The basic DMAA system consists of a monolithic memory expansion box and power supply, interconnecting ribbon cable and a controller. While different memory array sizes are possible, a system with 128K bytes of 18-bit words costs $10,000.

The controller alone costs $2,500 from Mini Mag at Suite 104, 5611 Kendall Court, Arvada, Colo. 80002.



The Mini Mag DMAA Fixed-Disk Subsystem

# Free Booklet Details Qume Print Products

SAN JOSE, Calif. — Qume Corp. is offering a brochure describing its print wheel and ribbon cartridge products usable with its daisy-wheel character printers.

The free brochure is available from Qume at 2350 Qume Drive, P.O. Box 50039, San Jose, Calif. 95150.

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Manager of Computer Performance

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Manager of Time Sharing Services

## *Dual Disk Drive System Bows*

CARSON, Calif. — A Shugart Associates, Inc.-compatible, single-density, single-sided, dual disk drive subsystem has been introduced by Tarbell Electronics.

The VDS-II Vertical Disk Subsystem includes two Siemens Corp. 8-in. disk drives, a Tarbell floppy disk interface, the CP/M disk operating system and Tarbell Basic. The unit uses IBM-compatible, soft-sectored 8-in. diskettes.

The capacity per drive is 256K bytes, with a 250 kHz transfer rate, the firm said. The Tarbell floppy disk interface is said to plug into any S-100 bus computer.

The subsystem's 32-byte read-only memory bootstrap program is automatically implemented using the Reset switch. It switches off when the bootstrap is completed, the firm claimed.

Four extra integrated circuit slots on the board are said to provide additional flexibility, and on-board circuitry permits the addition of up to four disk drives.

The VDS-II, sold assembled, comes with a fan and power supply, all cables and connectors and with hardware and software documentation. The unit costs $1,888. All components are available individually, including the cabinet alone or cabinets for one or three drives.

Tarbell Electronics is located at Suite B, 950 Dovlen Place, Carson, Calif. 90746.

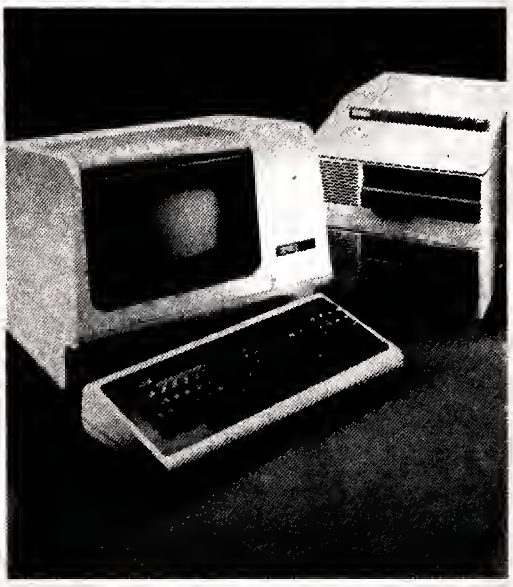
## Personnel Agencies, Offices Offered Turnkey System

WELLESLEY, Mass. — An information storage and retrieval system designed for personnel placement agencies and corporate employment offices has been announced by Information Recall Systems, Inc. (Irsi).

The Irsi Searcher I is a turnkey system featuring a multiple-category search capability that is said to prevent the user from "overlooking qualified applicants."

The system is capable of searching combinations of up to 20 user-selectable parameters such as skills, education and salary, the firm said. Searcher I reportedly enhances management control by allowing the systematic updating of files and the determination of the status of applicants.

The unit includes security codes at several levels, according to the manufacturer. The standard system has an operator code and a master code — the master code allows the holder to change either the operator code or the master code, a spokesman explained.



The Irsi Searcher I

Expandable for future requirements, the Irsi Searcher I includes a general-purpose Digital Equipment Corp. PDP-11 minicomputer, a CRT, a choice of printers and floppy or hard disk storage ranging from 512K to 20.8M bytes.

With an optional word processing package, correspondence can be automatically generated by searching files for key conditions. Accounting and sort programs are also optional.

The Searcher I starts at $12,800 including hardware, software, installation, training and 10 hours of custom design time, Irsi said from 177 Worcester Road, Wellesley, Mass. 02181.

## Data Devices Adds Cartridge Cleaner

CHATSWORTH, Calif. — A magnetic disk cartridge cleaner that is said to accommodate both top-loading and front-loading cartridges has been announced by Data Devices International, Inc.

The CMS-III also accommodates both .050 mil and .075 mil substrates, according to the firm. Top-loading cartridges are equivalent to the IBM 5440 and front-loading units are similar to the IBM 2315, a spokesman explained.

Weighing 26 pounds, the CMS-III allows the user to clean both disk surfaces in 15 sec, the firm claimed. The cleaner uses prepackaged cleaning pads saturated in a solution of 91% isopropyl alcohol and 9% dionized water.

The CMS-III disk cartridge cleaner costs $1,395 from 20235 Bahama St., Chatsworth, Calif. 91311.

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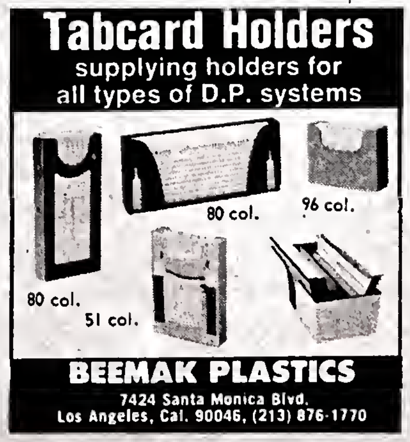

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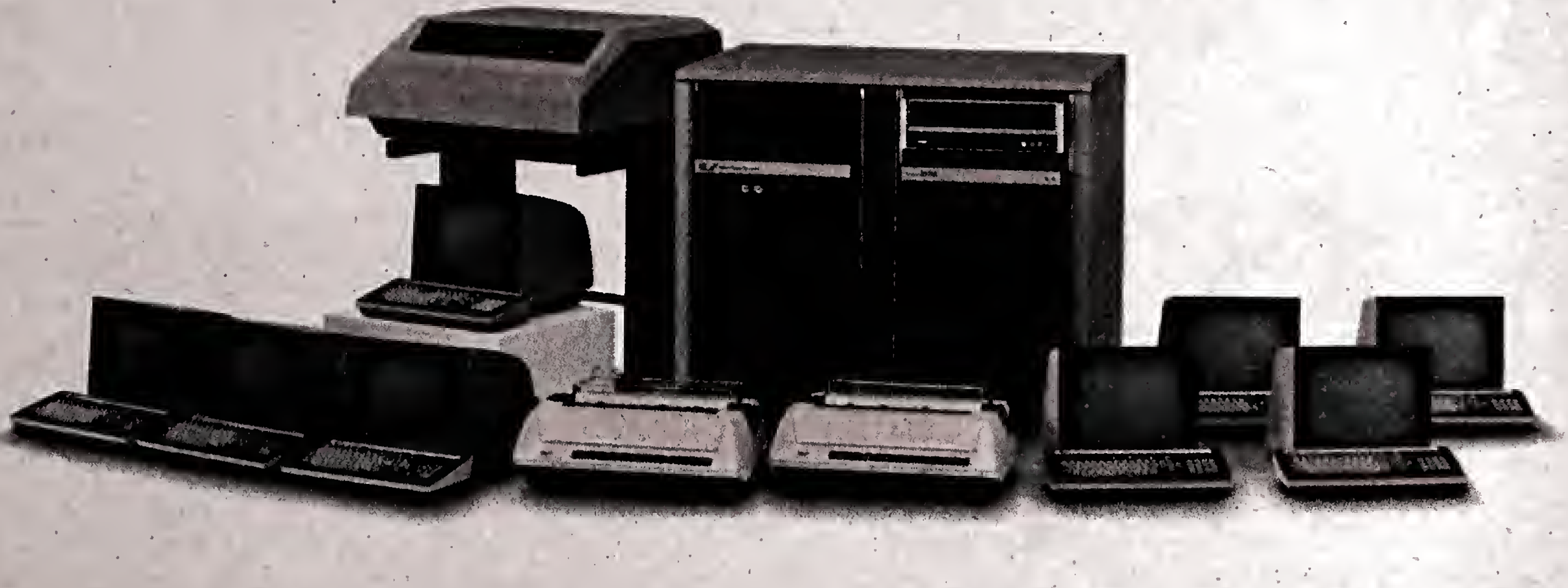

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# Minicomputers' Name May Mislead Users

*(Continued from Page 49)*

manufacturers led to software costs frequently exceeding hardware expenditures. As a result of this interest by the smaller business community and the size of the potential market, minicomputer manufacturers started concentrating on software.

The small computer industry soon offered full systems, configured with mini peripherals, with higher level languages such as Fortran and Basic. These systems were very well accepted, and the pressure of competition produced tremendous advances in both hardware and software.

By the early to middle 1970s minicomputers were offering word sizes up to and sometimes exceeding those of the larger machines, internal registers and I/O structures rivaling the full-sized CPUs and commercial languages such as RPG and Cobol. Interfaces and support software for large computer peripherals were being offered. Throughout all this evolution, the basic minicomputer itself was at a technological level equal to or in advance of its maxicomputer counterpart.

## 'Megaminis'

Today one can choose from a full line of computers termed "megaminis" by the trade press and purchase minicomputer systems with billions of character disk storage, thousands of lines per minute of printed output, banks of tape drives, hundreds of concurrent users and sophisticated multi-users operating systems providing full scientific and business higher level programming languages.

Certainly this is not what one normally thinks of as "mini."

Minicomputer manufacturers frequently market fixed equipment sets with one or two specific program development languages. These systems are artificially limited for marketing reasons and are typically offered to end users through OEMs, distributors and the like. These systems are the ones advertised with slogans like, "Get your own business computer system for $50,000," acccompanied by a picture of an attractive data entry operator sitting in front of a desk with a screen on it and one pedestal (which contains the computer and disk storage).

Normally, there is a range of such systems from each manufacturer. For example, you might get one terminal, 10M bytes of disk, a low-speed printer and one programming language for $50,000; four terminals, 20M bytes of disk, a medium-speed printer and a different programming language for $80,000.

Larger systems with other languages cost proportionately more. The limitations on these systems, although artificially imposed for marketing reasons, are real. The computers within these limited systems, however, are powerful machines.

## 'Sportscomputers'

In these energy-conscious times, compact cars have become popular. These vehicles offer attractive purchase and operational economies but are small and very low-powered relative to full-sized cars. They could probably be called "minicars" without misleading anybody.

The minicomputer of today is more the equivalent of a sportscar — smaller, to be sure, but equally as high-powered and frequently able to outperform its larger counterpart. In terms of capabilities, then, it would be much more accurate if minis were called "sportscomputers."

As sportscars presently offer all features and options found on the larger cars, so do minicomputers offer all features found on the larger computers, in terms of both hardware and software. Think of a mini as a sportscomputer and the name will let you know what they can do.

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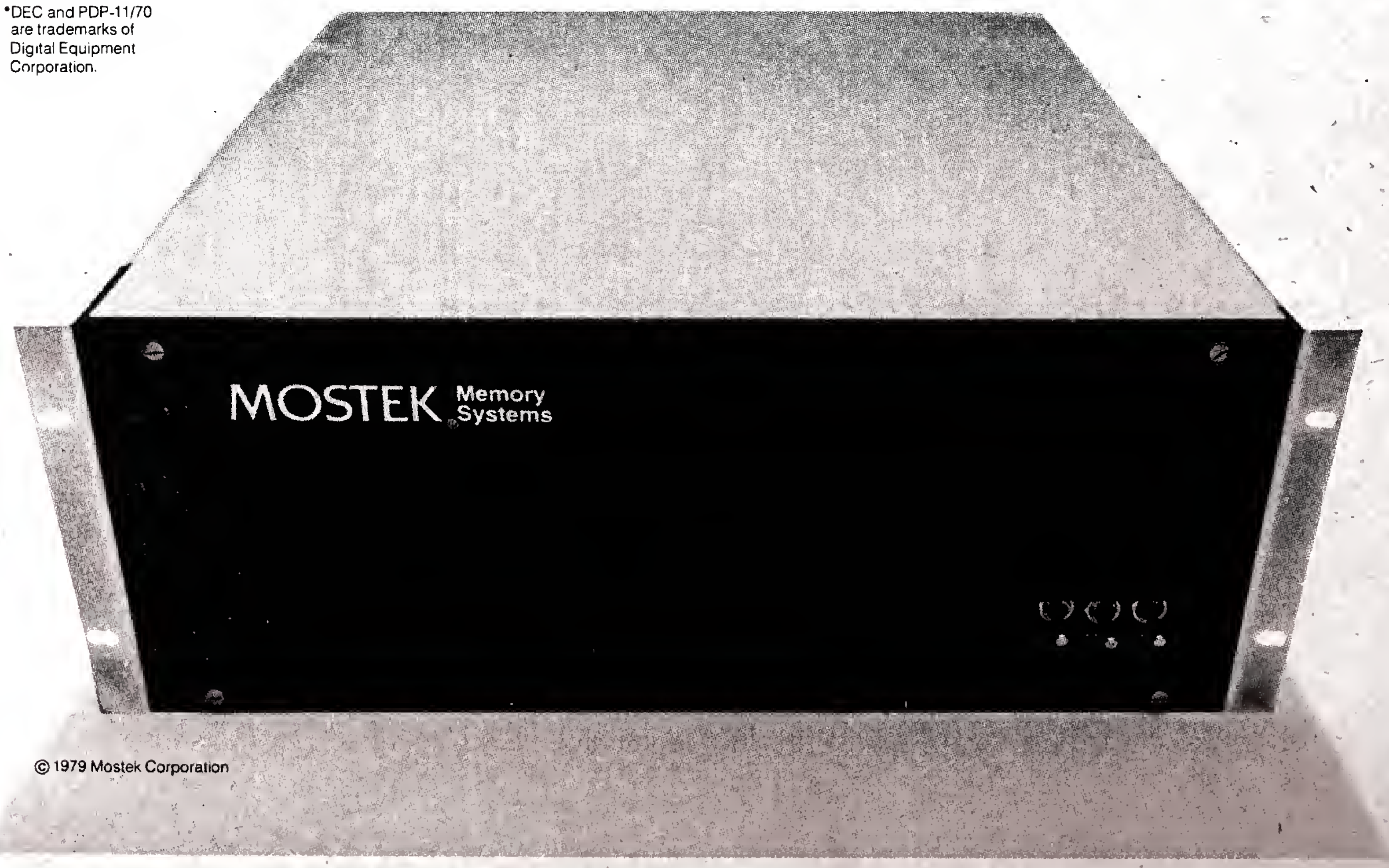

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### *A Measure of Its Popularity*

# Many Makers Offering Gear for Apple II

**By William L. Colsher**
Special to CW

A measure of the popularity of any computer system is the number of products marketed for use with it by companies other than the system manufacturer. Like the Radio Shack TRS-80, the Apple II from Apple Computer, Inc. ranks very high according to this measure.

Two recent surveys by microcomputer-oriented magazines indicated that the Apple II is second only to the TRS-80 in number of systems in operation. An evaluation of these studies gives a figure of about 30,000 for the number of Apple IIs in use.

This is a survey of many of the products currently available to Apple II owners. Like any such survey, this one is almost certainly incomplete. It does serve to give some idea of the range of products available and what prices a prospective purchaser should expect.

## Add-On Memory

As might be expected, memory add-ons in 16K-byte increments are the most common products for the Apple II. As in the case of the TRS-80, memory expansion in the Apple II is quite simple. No extra circuit boards are necessary; the memory integrated circuits (IC) plug into sockets already in place on the main circuit card.

Although the Apple II does not seem to have any problems with slightly "out-of-spec" memory ICs, it is still a good idea to purchase memory kits from a manufacturer that has made some sort of guarantee to replace defective ICs. I have found from experience that if a memory IC is going to fail, it will do so almost immediately; a 90 day guarantee is therefore probably sufficient.

The user who plans to operate his system under extremely adverse conditions might want to spend the extra money a longer guarantee period will cost.

Figure 1 contains a list of the manufacturers of memory add-ons for the Apple II. As is the case with all figures accompanying this survey, the manufacturers are listed alphabetically. Complete addresses and, in most cases, telephone numbers are provided in Figure 6.

**16K-BYTE MEMORY UPGRADES**

| MANUFACTURER | PRICE |
|---|---|
| California Digital | $65.00 |
| Godbout Electronics | $87.20 |
| Hobby World | $95.00 |
| Ithaca Audio | $119.00 |
| Jade Computer Products | $82.00 |
| JES Graphics | $89.00 |
| MicroComputer World | $89.00 |
| Priority One Electronics | $75.00 |
| The Computer Stop | $65.00 |
| The CPU Shop | $99.00 |

Figure 1

## I/O Interfaces

A computer is useless without some means of communication with the real world. The Apple II user has a particularly rich assortment of interfaces from which to choose (Figure 2).

These range from the low-cost Sup'R'Mod II video modulator used by virtually every Apple II owner to the $250 IEEE 488 interface that makes the Apple II compatible with a wide range of laboratory instruments.

Of more interest to the typical "home" Apple II owner is the wide range of serial and parallel interfaces that permit the Apple II to communicate with any of the low-cost printers and CRT terminals available today. Anyone who plans any serious development on the Apple II will need at least a serial interface to drive a hard-copy device.

## I/O Devices

In addition to the usual printers and terminals that all computer systems have, the Apple II is supported by a number of unusual I/O devices (Figure 3). An ac line controller from Mountain Hardware, Inc. enables the homeowner to control electrical outlets from his Apple II. The potential of this device for home security and energy-saving applications is obvious.

A light pen and voice input and output devices suggest applications for the handicapped. A mark sense card reader from Chatsworth Data Corp. could be used to speed the grading of exams in virtually every schoolroom.

Most interesting to businesspeople considering a small computer is the Corvus Systems, Inc. Winchester technology disk. Until the introduction of this device, the Apple II's utility in business applications has been seriously limited by lack of mass storage — only 5.25-in. minifloppies have been available.

The problem of backing up a mass storage device of this size is at least partly solved by the Meca Beta-1 high-speed cassette tape drive. This unit is capable of storing up to 1.4M byte per cassette.

## Hardware Enhancements

Like most other computers, the Apple II has its deficiencies. Unlike some, however, its architecture makes it fairly easy to accommodate changes.

For example, a simple plug-in adds lower case capability to the Apple II display. In contrast, adding the same capability to the TRS-80 is a major operation that involves wiring changes which void the warranty and make it more costly to get any future repairs from Radio Shack.

At least three timer or clock modules are available for the Apple II. This suggests that a large number of Apple II owners are using their systems in real-time operations. These could range from laboratory monitors to home control units.

A number of Apple IIs are being used with clock modules as community bulletin board systems. An example is the bulletin board being run by Personal Computers of Chicago at (312) 337-6631. To use it requires a 110- or 300 bit/sec terminal and modem. You dial the number, connect the modem to

*(Continued on Page 56)*

# CMA Unveils Two Packages For Apple II and TRS-80 Users

YUCCA VALLEY, Calif. — Two software packages have been released by Charles Mann & Associates for users of Apple Computer, Inc.'s Apple II and Radio Shack's TRS-80 microcomputers.

A statistical program for the Apple II features full use of the micro's graphics capabilities, according to CMA. The Statistics Package includes its own Scientific Data Management System (also available separately) and a battery of programs for curve fitting, probability, general statistics, distribution mathematics and test statistics.

The program utilizes the Apple graphics to allow for curve fitting of the data using linear, exponential, logarithmic or power relationships. A built-in data base produces a complete set of working examples useful in learning statistical principles, the firm said.

The general statistics element includes standard resolution plots for histograms and distribution arrays.

The system requires 32K of random-access memory (RAM) and at least one Disk II. It can handle up to five 100 by 1 matrices containing raw data, grouped data or frequency arrays.

A reference chart of legal variables is included to speed up data handling, the vendor noted. The Statistical Package is available for $89.95.

The software program for the TRS-80, designed for the engineer, architect or general contractor, includes elements for project planning, bid preparation, budget control and cost management.

Called the Project Management System, it permits financial control of a work assignment. A project manager can use available cost data to maintain up-to-date records on the progress of jobs under his control.

The system offers budgeting, cost recording, variance reporting and completion cost estimating capabilities.

The software requires a 32K-byte TRS-80 Model 1 Level II processor with at least one disk drive. A printer is optional. It costs $69.95 from any of CMA's dealers worldwide.

More information is available from CMA's Micro Software Division, 7594 San Remo Trail, Yucca Valley, Calif. 92284.

# Self-Study Training System Designed to Teach Concepts

BERKELEY, Calif. — Computeacher, a self-study training system to teach microcomputing concepts, is being offered by Sybex, Inc.

The Computeacher package includes a microcomputer board, program cassette, two educational books and manuals. An instructional audio cassette is also included to prep the user for connecting and using the board.

The two books that come with Computeacher are *Programming the 6502,* which teaches programming and the *6502 Applications Book,* which enables the user to program the input/output chips.

With the books, the user can reportedly design and build programs and simple interfaces to connect devices. It costs $299.

A third book, *Programming the Z80* by Rodney Zaks, will be published in October and costs $12.95. The book can be used as an introductory text on programming or as a self-contained reference book. It offers a complete description of the Z80 instruction set and an account of its internal operations.

Sybex is located at 2020 Milvia St., Berkeley, Calif. 94704.

# Variety of Peripherals. . .

*(Continued from Page 55)*

the line and send carriage returns until you get a response.

Figure 4 contains a list of hardware enhancements for the Apple II, including the ones mentioned above.

One of the most powerful indictments against the use of microcomputer systems is the lack of software. This problem is being addressed by a number of companies with considerable success.

A glance at Figure 5 reveals a wide range of "system" type software.

I have deliberately left out "applications" software because covering that topic would extend this article to unmanageable length.

As is the case with all software, the prospective purchaser should carefully verify that a given product will actually do the job he has in mind. "Cute" names for software shouldn't scare off buyers, either. I know at least one professional author who is using the text editor called "Dr. Memory" to edit manuscripts.

It is a good idea to carefully check into any company offering products through the mail since at least one has been found to be fraudulent. The best solution is to buy from your local computer store. Not only will you get a working product as soon as you hand over your money, but you will probably be able to compare products and choose the one that fits your requirements.

*Colsher extends special thanks for assistance in researching this article to Data Domain of Schaumburg, Ill., and Computerland of Downers Grove, Ill.*

### I/O INTERFACES

| MANUFACTURER | DESCRIPTION | PRICE |
|---|---|---|
| California Computer Systems | 7490 - IEEE 488 Interface | $250.00 |
| California Computer Systems | 7710 - Asynchronous Serial Interface RS-404 and RS-232C | $99.95 |
| California Computer Systems | 7712 - Synchronous Serial Interface | $99.95 |
| California Computer Systems | 7720 - Parallel Interface | $69.95 |
| California Computer Systems | 7470 - 3-3/4-Digit A/D | $129.00 |
| D.C. Hayes | Micro Modem II - Bell 103-Type Modem | $379.00 |
| Microproducts | Okidata Printer Interface | $49.95<br>$69.95* |
| M&R Enterprises | Sup'R'Mod II - Video Modulator | $29.95 |
| SSM | AIO - Serial and Parallel Interface | $135.00**<br>$175.00*** |

* With connection.
** Kit.
*** Assembled.

Figure 2

### I/O DEVICES

| MANUFACTURER | DESCRIPTION | PRICE |
|---|---|---|
| Chatsworth Data Corp. | MR-500 - Mark Sense Card Reader | $750.00 |
| Corvus Systems, Inc. | 10M-Byte Winchester Disk | $5,350.00*<br>$2,990.00** |
| Heuristics | Speechlab - Voice Input | $189.00 |
| Meca | Beta-1 - High-Speed Tape Unit | $400.00 |
| Mountain Hardware, Inc. | ac Line Controller | $379.00 |
| Mountain Hardware, Inc. | Supertalker - Voice Output | $279.00 |
| Programma International | Apple II Light Pen | $34.95 |

* First drive.
** Additional drives.

Figure 3

### HARDWARE ENHANCEMENTS

| MANUFACTURER | DESCRIPTION | PRICE |
|---|---|---|
| California Computer Systems | 7114 - Apple ROM - 14K ROM Board | $69.95 |
| California Computer Systems | 7740 - Programmable Timer Module | $150.00 |
| California Computer Systems | 7811 - 32-Bit Floating-Point Board | $399.00 |
| Dan Paymar | Lower Case Adapter | $49.95 |
| Microproducts | Eprom Programmer | $99.95 |
| Microproducts | Eprom Socket Adapter (Allows 5V ROM) | $14.95 |
| Mountain Hardware, Inc. | Romplus+ - 12K ROM Board (Including 2K Utilities) | $169.00 |
| Mountain Hardware, Inc. | Appleclock/Calendar Card | $199.00 |
| West Side Electronics | APT-1 - Real-Time Clock | $79.95 |

Figure 4

## Dealer Addresses

**California Computer Systems**
**309 Laurelwood Road**
**Santa Clara, Calif. 95050**
**(408) 988-1620**

**California Digital**
**P.O. Box 3097B**
**Torrance, Calif. 90503**
**(213) 679-9001**

**Chatsworth Data Corp.**
**20710 Lassen St.**
**Chatsworth, Calif. 91311**
**(213) 341-9200**

**The Computer Shop**
**16919 Hawthorne Blvd.**
**Lawndale, Calif. 90260**
**(213) 371-4010**

**Corvus Systems, Inc.**
**900 S. Winchester Blvd.**
**San Jose, Calif. 95128**
**(408) 725-0920**

**The CPU Shop**
**39 Pleasant St.**
**Charlestown, Mass. 02129**
**(800) 343-6522**

**Dan Paymar**
**P.O. Box 1-133, CS 6800**
**Costa Mesa, Calif. 92627**
**(714) 645-1411**

**D.C. Hayes Associates, Inc.**
**Suite 10116**
**Perimeter Park Drive**
**Atlanta, Ga 30341**
**(404) 455-7663**

**Godbout Electronics**
**Building 725**
**Oakland Airport, Calif. 94614**

**Hobby World**
**19355 Business Center Drive**
**Northridge, Calif. 91324**

**Holistic Data Systems, Inc.**
**Suite 466; 2210 Wilshire Blvd.**
**Santa Monica, Calif. 90403**
**(213) 450-6192**

**Ithaca Audio**
**P.O. Box 91**
**Ithaca, N.Y. 14850**
**(607) 257-0190**

**Jade Computer Products**
**4901 W. Rosencrans Ave.**
**Hawthorne, Calif. 90250**
**(800) 421-5809**
**(800) 262-1710 (Calif. only)**

**JES Graphics**
**P.O. Box 2752**
**Tulsa, Okla. 74104**
**(918) 742-7104**

**M&R Enterprises**
**Box 61011**
**Sunnyvale, Calif. 94088**

**Meca**
**7026 O.W.S. Road**
**Yucca Valley, Calif. 92284**
**(714) 365-7686**

**Micro Computer World**
**P.O. Box 242**
**San Dimas, Calif. 91773**
**(213) 286-2661**

**Microproducts**
**2107 Artesia Blvd.**
**Redondo Beach, Calif. 90278**
**(213) 374-1673**

**Muse Co.**
**7112 Darlington Drive**
**Baltimore, Md. 21234**
**(301) 661-8531**

**Mountain Hardware, Inc.**
**300 Harvey West Blvd.**
**Santa Cruz, Calif. 95060**
**(408) 429-8600**

**Priority One Electronics**
**16723 Roscoe Blvd.**
**Sepulveda, Calif. 91343**

**Programma International, Inc.**
**3400 Wilshire Blvd.**
**Los Angeles, Calif. 90010**
**(213) 384-0579**

**PRS**
**257 Central Park West**
**New York, N.Y. 10024**

**Pygmy Programming**
**P.O. Box 3078**
**Scottsdale, Ariz. 85257**

**Scelbi Publishing Inc.**
**P.O. Box 3133**
**Milford, Conn. 06460**

**SSM**
**2116 Walsh Ave.**
**Santa Clara, Calif. 95050**
**(408) 246-2707**

**Sublogic**
**Box V**
**Savoy, Ill. 61874**
**(217) 367-0299**

**Trans-Data Corp.**
**161 Almeria Ave.**
**Coral Gables, Fla. 33134**
**(800) 327-8455**

**West Side Electronics**
**P.O. Box 636**
**Chatsworth, Calif. 91311**

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SOFTWARE

| MANUFACTURER | DESCRIPTION | PRICE |
|---|---|---|
| | GRAPHICS | |
| Muse | U-Draw II-32K Disk Package | $39.95 |
| Programma International | 3D Animation | $24.95 |
| PRS | 2D Function Plotter | $34.95 *<br>$54.95** |
| Sublogic | 3D Graphics | $45.00 |
| | LANGUAGES | |
| Microproducts | Editor/Assembler | $34.95* tape |
| Muse | Applilot - Pilot CAI Language | $49.95 |
| Programma International | Apple Forth - Forth Language | $34.95*<br>$49.95** |
| Programma International | ASM65 - Assembler/Editor | $69.95 |
| Programma International | Lisa - Interactive Assembler | $34.95** |
| | TEXT EDITORS | |
| Muse | Dr. Memory | $49.95 |
| Programma International | Programma Improved Editor | $19.95*<br>$24.95** |
| Pygmy Programming | Apple Scribe II | $49.00 |
| Trans-Data Corp. | Word Processor | $60.00 |
| | IMS | |
| Holistic Data Systems, Inc. | Databasic - 16K Disk Data Base Manager | $100.00 |
| Muse | Micro Information System - A/P, A/R, Inventory, ML, etc. | $99.95 |
| Pygmy Programming | Apple-DMS - 48K Disk System | $49.00 |
| Sceibi | Personal Information Management System | $24.95 |
| Trans-Data Corp. | File Management System | $60.00 |

* Tape.
** Disk.

Figure 5

# AMI Introduces Version Of 6800 Microprocessor

SANTA CLARA, Calif. — American Microsystems, Inc. (AMI) has introduced a version of the 6800 microprocessor capable of executing an instruction in 800 nsec, or 200 nsec faster than any other 6800 microprocessor currently available, the vendor claimed.

Called the S68H00, the AMI unit uses a 2.5 MHz clock and can execute one data access instruction per two clock cycles, the firm said. The S68H00 uses 8-bit parallel processing and has a bidirectional 8-bit data bus and a 16-bit address bus. The set contains 72 instructions, with seven addressing modes. The instructions execute in speeds from two to 12 machine cycles of 400 nsec apiece.

AMI has also introduced the S68H21 peripheral interface adapter with a 2.5 MHz speed to enable configuration of a high-speed microcomputer using two AMI S2114 1K-by 4-bit random-access memory (RAM) and an S4216B 2K-by 8-bit read-only memory (ROM).

The S68H00 costs $83.85 in ceramic and $49.95 in plastic. The S68H21 costs $67.60 in ceramic and $28.80 in plastic. AMI is at 3800 Homestead Road, Santa Clara, Calif. 95051.

# Two Micro Courses Slated

WASHINGTON, D.C. — George Washington University will be holding a course on microcomputers for business and a course on microprocessors for engineers, managers and those who are using or planning to use microprocessors and would like a better understanding of these systems.

"Microcomputers for Business," to be held Nov. 7-9, was designed to help nontechnical professionals understand how microcomputers can be used and applied to their own businesses. Through this course, participants can gain the background needed to make informed decisions about the small systems now on the market, a spokesman said. The course will cost $420.

"Microprocessors" will provide participants with an understanding of the principles of microprocessor hardware structure, architecture and software and will provide a fuller awareness of the capabilities and limitations of the microprocessor.

The course, which will be held Nov. 12-14, costs $450.

Further information is available from the Continuing Engineering Education Program, George Washington University, Washington, D.C., 20052.

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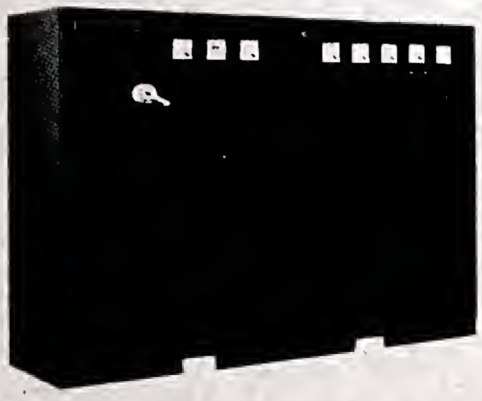

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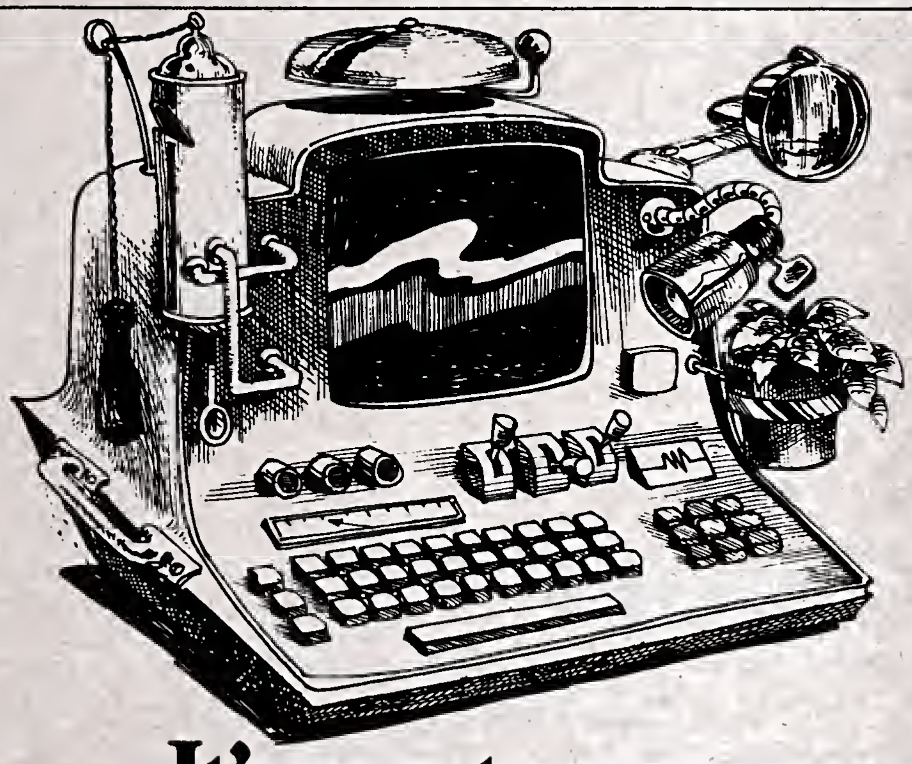

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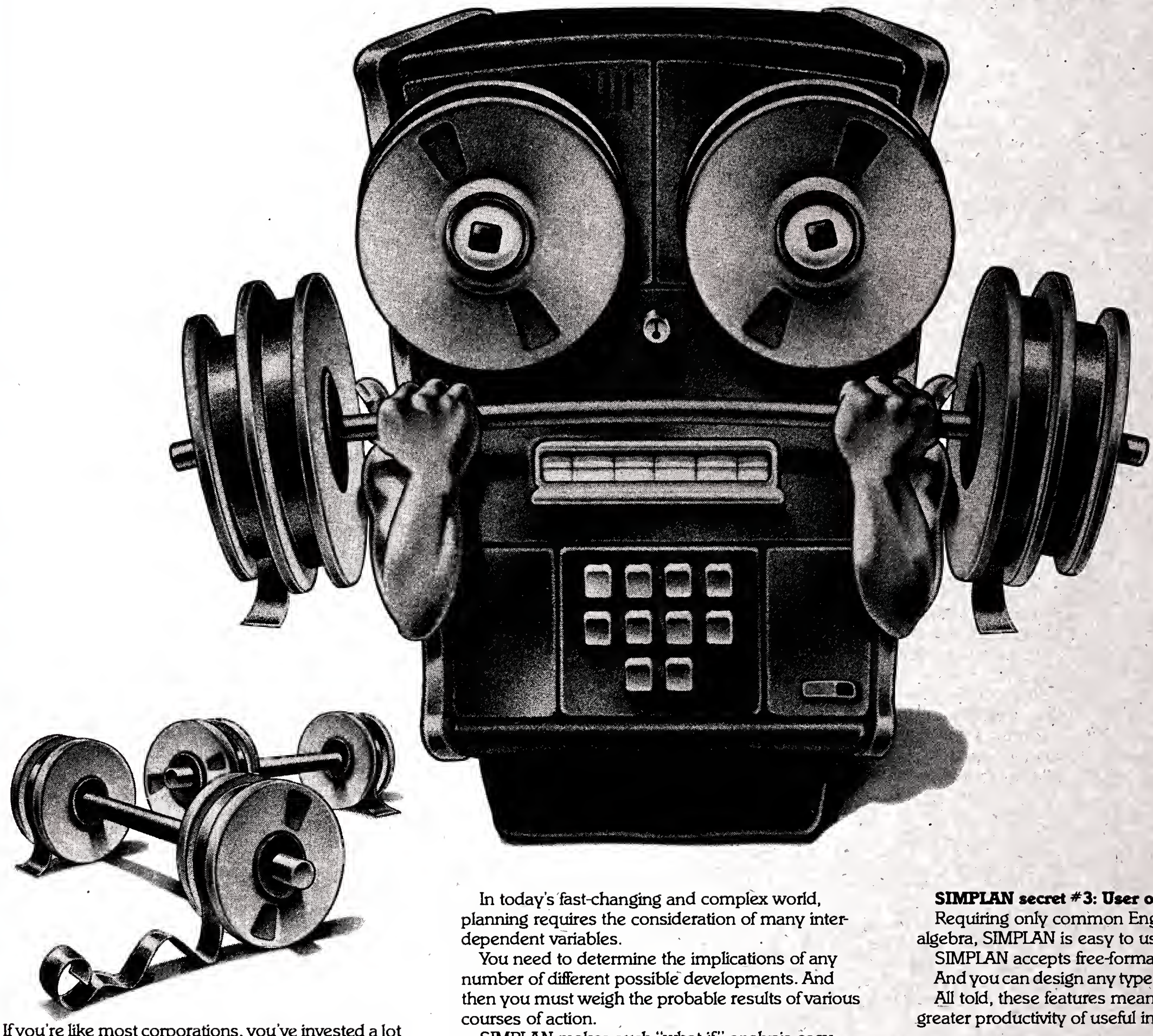

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- Model solution
- Policy simulation
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- Report changes
- Report generation
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- Econometrics
- Graphics display
- Security

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## *Although Approaches Vary*

# Office Gear Dealers Entering DP Mart

**By Marcia Blumenthal**
CW Staff

Office equipment dealers planning to add small business systems to their product lines should "double the amount of money they anticipate investing in the venture," according to one dealer who recently entered the high-technololgy arena.

Jack McWhirter, vice-president and general manager of Hyland-Rice Office Products, Inc. of Fitchburg, Mass., said at least $75,000 to $80,000 is needed to enter the market.

Aside from the financial investment, McWhirter stressed the importance of having a "super" maintenance department and putting a good deal of effort into educating the public to buy computers from an office equipment supplier.

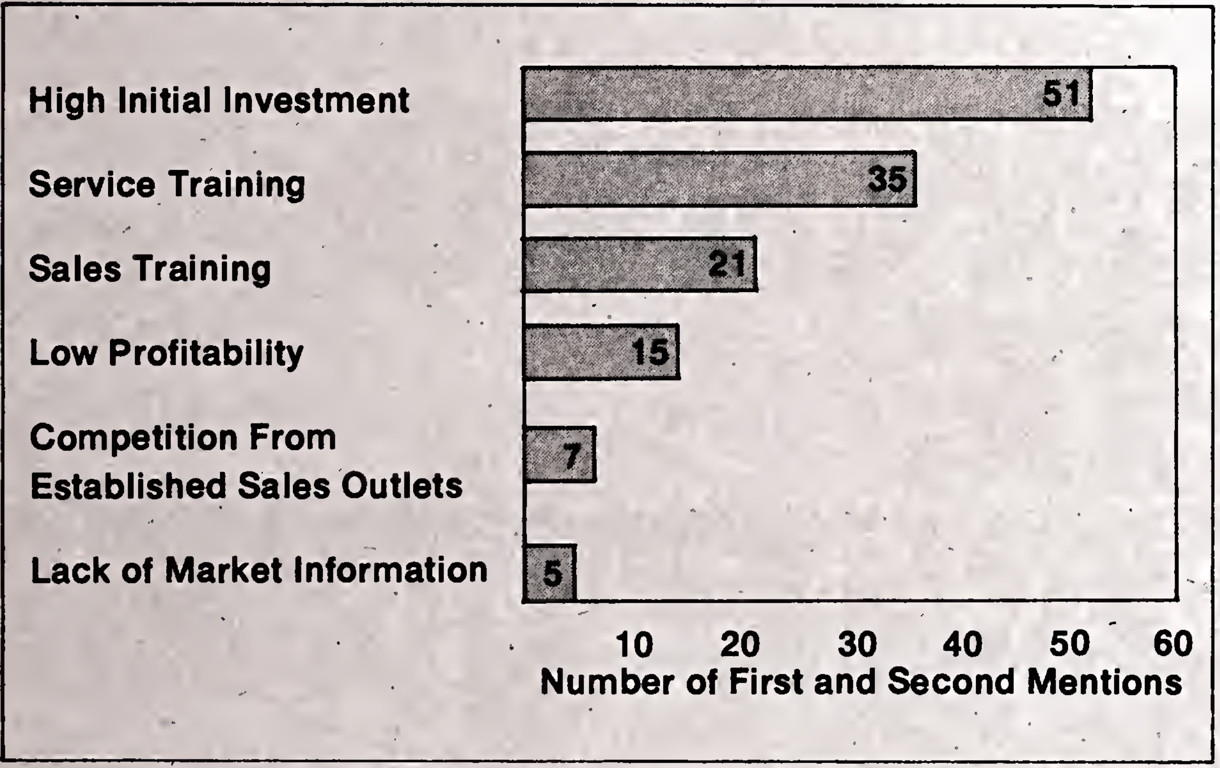
Although the number of dealers that have ventured into high-technology sales are few, a recent survey of 1,000 office products dealers showed that 37% of the responding dealers contemplated carrying small systems within the next two years. Only 17% of those dealers currently sell computers (see accompanying charts).

Recent *Computerworld* interviews with some of those dealers found no clear-cut approach to the market in respect to either the price of the systems carried or the thoroughness of investigating the market's prospects. Some dealers are opting for relatively high-priced systems while others see opportunity only in systems costing $10,000 or less. Some approached the market in an orderly studied fashion while others plunged ahead with little attention to selection of suppliers and software considerations.

| High Tech Lines | Carry Now (Percentage) | Plan To Start Carrying In 1-2 Yrs. (Percentage) | Plan To Start Carrying In 5 Yrs. (Percentage) |
|---|---|---|---|
| Word Processors | 28.8 | 18.6 | 11.0 |
| Computers | | | |
| Micros | 7.6 | 17.8 | 5.9 |
| Minis | 9.3 | 19.5 | 11.9 |
| Peripherals | 8.5 | 11.9 | 5.9 |
| Software | 16.1 | 11.0 | 4.2 |

Charts Courtesy of Office Products Dealer

Dealer Commitment to High-Technology Lines



Major Obstacles to Carrying High-Technology Lines

### Careful Approach

One dealer who opted for higher priced systems is Allee Office Equipment, Inc. of Tulsa, Okla. "It costs just a much to sell a smaller unit as a larger unit to the first-time customer," John Proffitt, systems manager for the firm, reasoned.

Recognizing that its customers need far more sophisticated equipment, Allee started selling Xerox Corp.'s Diablo 3200 nearly a year ago. Proffitt said the company has to install 12 systems a year to maintain an acceptable profit margin.

The Diablos are priced between $20,000 and $60,000. To date, the company has installed eight systems.

In selling computers, dealers must make the transition from a unit sales mentality to a systems sales approach, Proffitt observed. Before selecting its equipment, Allee spent a year evaluating vendors. Proffitt said Allee wanted to do business with a firm that would be around for a long time and whose name was a drawing feature.

Proffitt stressed the importance of acquiring software that had been in the field a long time and was therefore "user-tested."

Allee started with two people in its small systems sales and maintenance operation

(Continued on Page 62)

# *Nixdorf Reaches for the Pocket*

**By Connie Winkler**
CW Staff

NEW YORK — Nixdorf Computer Corp. has taken to peddling pocket computers at Macy's with the acquisition of worldwide marketing and manufacturing rights to what has been known as the $200 Lexicon LK 3000 translator.

With this move, Nixdorf is planning to enter into the personal computer market. The German company will market the LK 3000 to businesses through its marketing force and to consumers through department stores, according to President Klaus Luft.

Nixdorf paid $2.5 million for the exclusive license agreement with Lexicon Corp. and will also pay royalties on each LK 3000 sold.

"The Nixdorf LK 3000 is a small pocket computer for general-purpose use," Luft said. "It is not a translator."

Lexicon, of Miami, was the first to bring out the hand-held language translator, and about 30,000 have been sold with interchangeable application modules to translate German, English, French, Greek, Italian, Spanish, Polish and Swedish words and idioms. The unit can store about 1,000 characters, and supplies of the product are now falling short.

"We have carried the product line as far as our resources permit," Lexicon president Michael Levy said. "Now is the time to bring in a partner to permit worldwide

(Continued on Page 60)

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# Nixdorf Adds Pocket Calculators

*(Continued from Page 59)*

sales."

Lexicon will continue to provide research and development services to Nixdorf Personal Computer Systems, Inc., which has taken over the marketing and manufacturing of the product.

Luft said Nixdorf has no plans to acquire Lexicon, but added that he "never says never."

Nixdorf, which until now has specialized in small business computer systems, intends to follow through with Lexicon's plans to provide the LK 3000 with an interchangeable module containing past scores of the Olympics in time for the 1980 winter and summer games. Such modules will cost about $95, in addition to the $200 for the pocket processor.

Other immediate plans include production of a filing system module allowing businesses to translate names to numbers and development of a personal program that can be freely programmed as a personal date book or telephone directory.

By 1980, Nixdorf plans to develop 15 modules for the LK 3000. For the long term, Nixdorf envisions the LK 3000 functioning as a workstation like the data entry workstations Nixdorf has successfully sold to American data processors.

The LK 3000 will store information needed in business such as price lists, medical and insurance tables. With communications capabilities, it can provide stock market quotations or airline schedules.

Luft said he foresees adding I/O devices to the LK 3000 and interfacing it with televisions, computers and telephones. Nixdorf also wants the modules to be programmable by the consumer so they can be updated.

As for potential applications for the LK 3000, "the end is nowhere in sight," according to Christopher Washburn, vice-president of marketing for Nixdorf's Personal Systems and formerly of Lexicon.

Nixdorf plans to build up manufacturing companies in Malaysia and Singapore, where the LK 3000 is now being supplied, but Luft offered no projections as to how many LK 3000s Nixdorf plans to sell.

## Contracts

Recognition Products, Inc. has received a contract from Data Terminal Systems, Inc. for the purchase of optical character recognition wand readers.

**E-Systems, Inc.'s ECI Division has received a $2.1 million addition to a U.S. Navy contract for the AN/SYR-1 communications tracking system for use with the Terrier SM-2 missile.**

Wang Laboratories, Inc. has received a contract from the U.S. State Department for 32 VS/WP Integrated Information Systems.

**Consolidated Data Terminals has signed a one-year contract with Western Telematic, Inc. to sell its complete line of standard and minifloppy disk terminals.**

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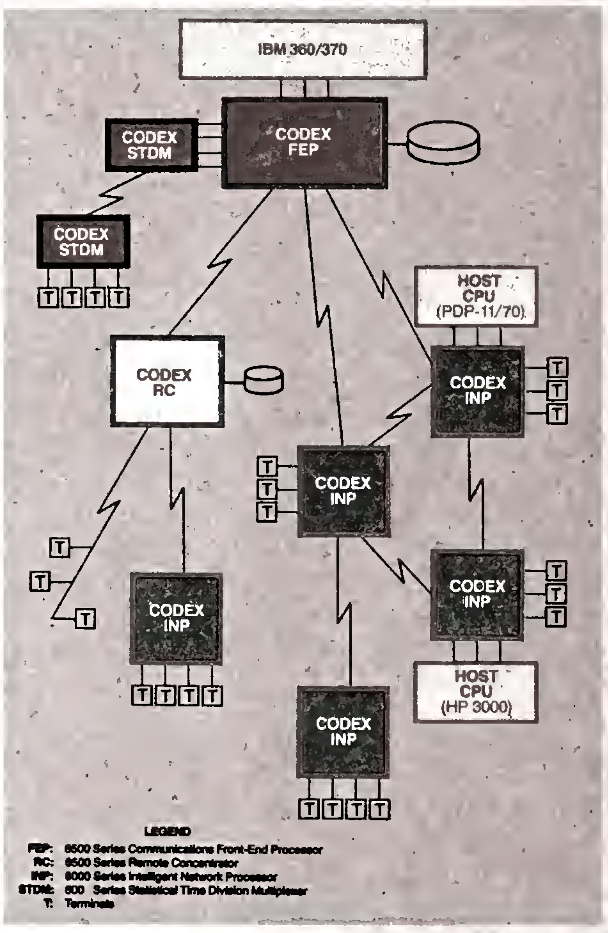

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## Financial News

# Anacomp Earnings Up 95%, Revenues 89% in Quarter

INDIANAPOLIS — Anacomp, Inc. reported an 89% increase in revenues and a 95% increase in earnings during its fourth quarter of fiscal 1979 ended June 30.

For the full year, the firm recorded a 76% increase in revenues and a 70% increase in earnings compared with results a year ago.

For its fourth quarter, Anacomp's revenues reached more than $11 million vs. the $5.8 million in revenues for the same period a year earlier.

Earnings totaled $952,470, or 33 cents per share, for the quarter, up from the $489,032, or 20 cents per share, earned in the previous year.

### Year Results

For the full year, Anacomp's revenues topped $38.1 million compared with $21.6 million in revenues a year ago. For fiscal 1979, earnings were $2.6 million, or 83 cents per share, vs. the $1.5 million, or 53 cents per share, recorded in the previous year. Per share results have been adjusted to reflect a 7% stock dividend paid last month.

The firm's positive financial growth stems from expansion of internal operations and contributions from six acquisitions, a company spokesman said.

During fiscal 1979, Anacomp acquired Escom, Inc; Sci-Tek Associates; Computer Services Corp.; Access Data Systems; Erco, Inc.; and the bank division of Wachovia Services, Inc.

In addition, Anacomp recently signed a definitive agreement to acquire Computer Micrographics, Inc. (CMI). If approved, the agreement would involve an exchange of .7 shares of Anacomp for each share of CMI.

# SEL Revenues Hit $65 Million

FORT LAUDERDALE, Fla. — Systems Engineering Laboratories, Inc. (SEL) reported revenues of $65.1 million for its fiscal year ended June 29, compared with revenues of $52.9 million a year ago.

For the year, earnings reached $3.8 million, or $1.31 per share, vs. the $2.8 million or $1 per share earned a year ago. All earnings are before extraordinary gains for tax loss carryforwards.

For SEL's fourth quarter, revenues totaled $18 million compared with revenues of $17.5 million last year. Income was $1.2 million, or 43 cents per share, compared with earnings of $940,000, or 32 cents per share, a year ago.

# *REI Facing Unprofitable Year*

DALLAS — Although Recognition Equipment, Inc. (REI) is attempting to improve cost control and productivity, Jay Rodney Reese, the firm's president and chief executive officer, said that based on nine months' results, the company's current fiscal year will be less profitable than fiscal 1978.

For its third quarter, REI earned $400,000, or 7 cents per share, compared with $1.4 million, or 24 cents per share, a year ago. During the quarter, the lack of profitability in some of the domestic companies necessitated the reversal of a $461,000 benefit from an operating loss carryforward taken in the previous quarter, he said. This adversely affected net income for the present quarter.

For the quarter, the firm had revenues of $23.9 million vs. revenues of $23 million a year ago.

For the nine-month reporting period, revenues totaled $71.5 million, up from $63.7 million for the same period last year.

Earnings were $2.6 million, or 44 cents per share, compared with the $4.2 million, or 71 cents per share, earned last year.

As of July 31, the company's backlog totaled $49.4 million compared with firm orders of $46.9 million a year ago. Purchased value of the equipment shipped for lease or purchase during the third quarter was $7.9 million as opposed to $15.6 million a year ago.

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# *Wiser for the Experience*

**By Marcia Blumenthal**
CW Staff

JEFFERSON CITY, Mo. — Less than a year after sinking nearly $500,000 into DP products, office equipment dealer Modern Business Systems found itself out in the cold when its supplier, Cincinnati Milacron, Inc., decided to phase out its George line of small business systems [CW, July 17, 1978].

Although Paul Pierce, president of Modern Business Systems, had made a sizable investment in the creation of application packages for the George line, his firm was able to transfer much of the technical capability to another vendor's product.

After floundering around for a couple of months, Pierce chose Texas Instruments, Inc.'s 990 system. However, the office products company, which spans nine states and last year had $25 million in revenues, had to spend an additional $200,000 for the changeover.

Fortunately, Pierce recently "satisfactorily settled" a lawsuit he brought against Cincinnati Milacron.

Modern Business Systems originally decided to carry Cincinnati Milacron's products because it obtained an exclusive franchise arrangement with the Ohio-based firm and considered the supplier to be committed to the small systems market.

The wiser for his experience, Pierce chose TI because of its system's technical features rather than a favorable dealership arrangement.

In evaluating systems, Pierce knew he wanted a system not based on floppy disks but with expandable main memory and a sophisticated operating system capable of accommodating data base applications.

Pierce's DP department currently employs eight people in application software development; this number will double within the next year.

Pierce also plans to add another 12 salespeople during that time frame.

# Office Dealers Now Selling DP

*(Continued from Page 59)*

and has since added five. "You are virtually holding the user's hand, so you have to be the single source for everything," Proffitt concluded.

Like Allee, Hyland-Rice approached the market in a sophisticated manner. McWhirter had been a field engineer at Inforex, Inc., Hyland-Rice knew of his computer know-how and offered him a partnership.

The computer portion of the business is conducted through a separate company, Hyland-Rice Business Systems, Inc., which started last February; it now has three employees.

Opting for a system from Infotacs of Manchester, N.H. rather than a well-known vendor, McWhirther thinks the service aspect of Hyland-Rice's system business is its major selling point. He chose Infotecs because the firm had built a Digital Equipment Corp. PDP-8-type system for one-third of DEC's price and only sells through dealers.

McWhirther figures his firm must sell two systems a month to make a go of the venture. The system is priced between $11,000 and $20,000 and software sells for about $1,500 to $4,500 per package. Hyland-Rice is concentrating on selected vertical markets, such as certified public accountants and fuel dealers, targeting one market at a time.

### Leapt Before Looking

While Hyland-Rice Allee had explored the market thoroughly before taking the plunge into systems sales, Bomar Office Supply of Kalispell, Montana, barely looked before leaping into selling Olivetti Corp.'s ECS 3033 system in April, 1978.

While installing a similar system for its own business, Bomar decided to take on the small business systems line. "It's been a money-loser. The application software doesn't work. We got involved when Olivetti was making tremendous changes in its product line. Programs were written in assembler and had to be converted to Basic or RPG-II," Robert G. Blake Jr., executive vice-president, lamented.

Bomar did not have enough help to make necessary software changes, Blake said, observing that it is difficult to find programmers in Montana.

Moreover, Bomar found its customers wanted a system costing $10,000 to $17,000 rather than Olivetti's $15,000 to $35,000.

The firm is now considering selling Randal Data Systems, Inc.'s products, but Blake reckons the changeover will cost an additional $60,000. Bomar has already invested about $120,000 getting into systems sales.

Like Bomar, Paul Business Systems, Inc. underestimated the importance of software. "Originally the operation was not profitable at all. There was a misconception that you gave away software," Solon Paul, the firm's president, noted.

After "suffering considerably" for three years, Paul has now started networking with other dealers to obtain the necessary software offerings. To date, he has still not hired a full-time programmer to make modifications on programs because part-time programmers in the Washington, D.C., area are abundant.

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## *Floppies, Winchesters to Set Pace*

# Report Predicts Small Disk Market to Balloon

SAN JOSE, Calif. — Three new storage technologies — 5.25-in. "minifloppy" disks, 8-in. "mini-Winchester" hard disks and "micro-Winchesters" — will set the pace for growth in the small disk OEM market for the next five years.

Fueling the demand for these new disk products will be a burst of new applications for personal computers, word processors, intelligent typewriters, CRT terminals and small business computers, according to a report from Creative Strategies International (CSI).

CSI predicted that minifloppy production will jump from 307,000 units this year to 1.83 million units by 1983.

Similarly, mini- and micro-Winchester production will balloon from about 13,000 units in 1979, their first year on the market, to more than 580,000 units in five years.

Demand for these products will contribute to 28% annual growth of the worldwide disk market from a current "if-sold OEM" value of $284 million to $758 million in 1983, the report said.

### Maturing Technology

Over this period, worldwide unit shipments of floppy disk drives will soar 34% per year from 656,000 in 1978 to 2.81 million in 1983.

By that time, however, floppy disk drives will become a fully matured technology, having already weathered the difficult transition from single- to double-sided recording.

Manufacturers now are working to gain double disk storage capacity by increasing track density, already achieved by Micropolis Corp. on minifloppies and expected on 8-in disks within two years, CSI noted.

A further doubling of capacity to almost 5M bytes will be accomplished through "track following" techniques, reportedly under development at Burroughs Corp. and Hewlett-Packard Co.

Despite these technological advances, CSI foresees a squeeze in the low-end OEM floppy market because of increased competition from foreign competitors and a trend to backward integration into captive production by customers with large-unit volume requirements.

### Micro-Winchester Boosts

Storage capacities for the micro-Winchesters are expected to range initially from 1M to 3M bytes at prices comparable to that of present 512K-byte double-sided minifloppies. When micro-Winchesters enter the marketplace late this year, CSI further predicted, they will provide 10 times the access speed of minifloppies.

The 8-in. mini-Winchesters will offer 5M to 60M bytes of storage at prices approaching the cost of today's 1.2M-byte top-of-the-line floppies — starting at about $600 for OEMs.

In smaller capacity ranges, magnetic bubble memories may also replace floppies for on-line storage functions, according to the report. By the mid-1980s, CSI expects bubble memories to drop in price (per byte) to what floppies cost today, but to offer about 100 times the access speed.

### Two New Threats

Also threatening to invade the floppy disk turf are two new developments slated to come on the scene in the mid-1980s: on-line archives and back-end processors, which consist of large-scale integrated (LSI) circuits that combine disk controller and data base management functions.

As a result, many OEM manufacturers are zeroing in on high-end disk products, particularly the mini- and micro-Winchester devices. The latter are rigid and flexible disks measuring less than 8 in. in diameter.

These hard disk products, as well as magnetic bubble memories, back-end processors and on-line archives, promise to present stiff competition for floppies not far down the road.

Likely to eventually displace floppies from their on-line storage role in small business computers will be the mini- and micro-Winchesters. These devices will use "flying" (air-bearing) recording heads to offer faster speeds and greater capacities at relatively low incremental cost, according to CSI.

### Back-End Edge

The advantage that back-end processors will have over floppies is an ability to improve a system's file-handling capabilities by using highly parallel architecture, associative memory and magnetic bubble or charge-coupled device buffers along with hard disks such as mini-Winchesters.

On-line archives, the report said, could eventually ease in to the off-line storage role currently enjoyed by floppies. The reason? They will provide at least 1,000 bytes of storage to allow users to keep all their data permanently on-line. Prices of on-line archives will be several thousand dollars, or equal to that of microcomputer-based systems.

The report, called "Rotating Peripheral Memories I: Floppy Disks and Low-Cost Winchesters," costs $895 from CSI, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

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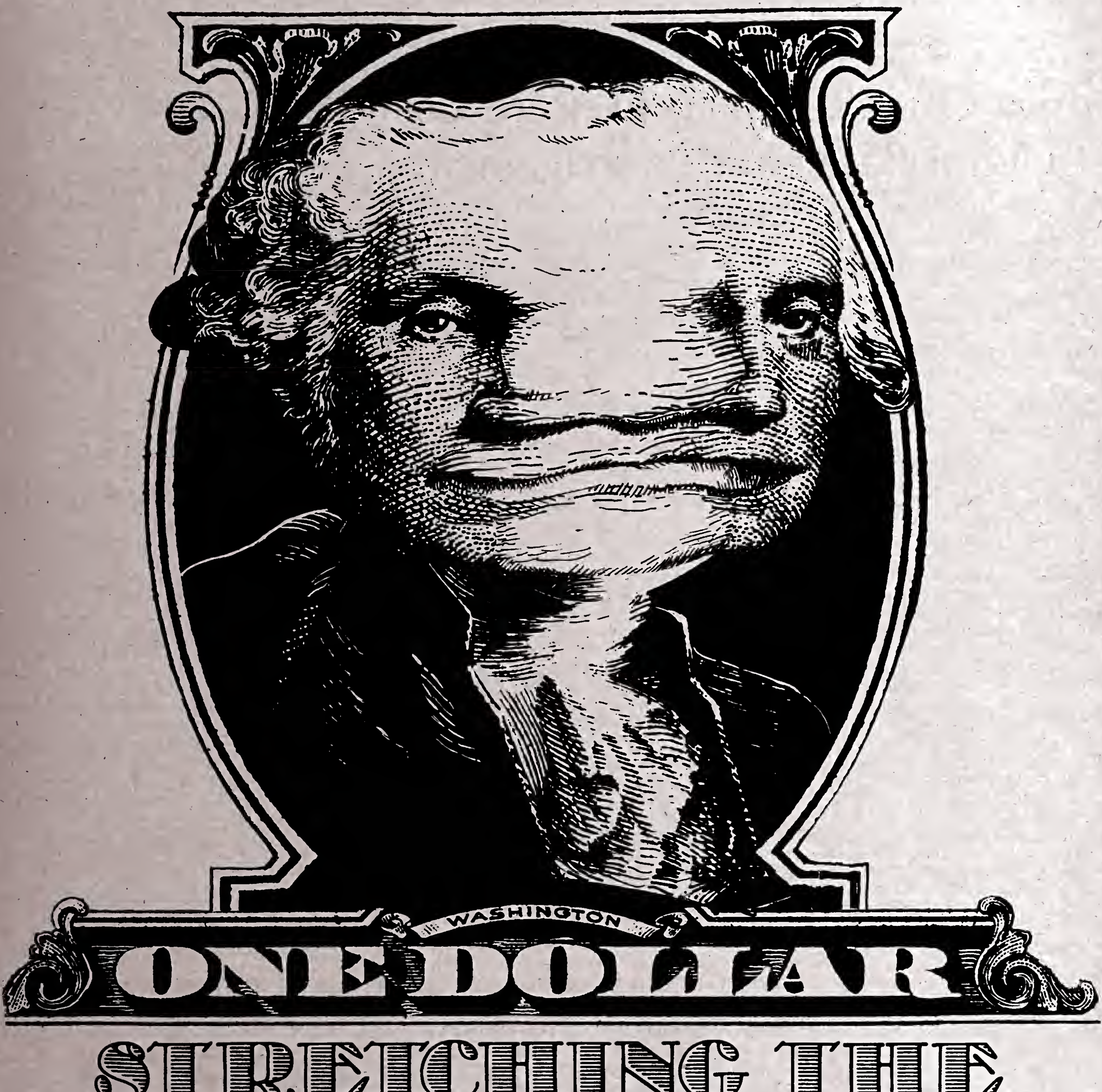

# STRETCHING THE DP DOLLAR

Edited by Howard A. Karten

## *Employees Provide Labor*

# Printer Presses Large System Into Tight Budget

By W.D. Crispin
Special to CW

LOS ANGELES — By using in-house personnel and choosing hardware in a somewhat unorthodox way, my firm managed to save a significant amount of money in its DP operations.

Interweb, a publication printing company here, made a decision late in 1976 to locate terminals in almost every area of the business.

We began by purchasing a Hewlett-Packard Co. 3000 Series I system with the MPE-C operating system. That purchase was our first money-saving step.

A year earlier we had investigated that system and found it too expensive. With the introduction of the HP 3000 Series III, however, the price of the Series I dropped substantially, falling within our budget.

To achieve an additional savings, we ordered the system with an 800 bit/in. tape drive instead of the more common 1,600 bit/in. That saved us $3,000 and didn't pose any appreciable problem, since almost all of our processing is disk-oriented. Tapes are used only for daily backup and off-line file storage.

### Twenty-Eight Terminals

The company operates in four different buildings separated by a distance of seven miles, so we knew we needed a terminal system. We needed 28 terminals, so we began looking for RS-232C-compatible units.

We investigated many of the dumb terminals available, most of which ranged in price from $1,200 to $1,800 each. We found that Soroc Technology, Inc. of Anaheim, Calif., had a terminal available for $800 each if purchased in quantity. That terminal included, in addition to the normal keys, four screen-editing keys located next to a 10-key pad.

We achieved a cost savings of more than $11,000 by choosing the Soroc terminals over the least expensive alternative. However, one of our requirements was for a comma key located within or next to the 10-key pad, and the Soroc keyboard did not provide one.

To accomplish this, we called on a maintenance electrician we knew. He had worked for a computer vendor and, since retiring, has made himself available to industry for various kinds of maintenance contracts and freelance electrical work. He is currently performing all our maintenance on the terminals whenever there is a problem.

For $130, he cross-wired the comma key to one of the standard graphics keys located directly next to the 10-key pad on 26 of our terminals. In this regard, our choice of the Soroc terminal was a good one, since most of the dumb terminals costing significantly more either had no 10-key pad or no additional key that could be used.

### Transformer on the Ceiling

Our next problem was the installation of the computer and the terminals. One situation we ran into was the installation of an isolation transformer for the system.

To avoid having to redo the air conditioning system for the computer room we then had, we mounted the transformer on the ceiling, where it was open to the outside air rather than the computer room. This alone saved us about $10,000 in air-conditioning costs.

(Continued on Page SR/10)

# County Court Combats Welfare Costs With Mini-Based File Management

BUCKS COUNTY, Pa. — A minicomputer-based file management system here has helped the Bucks County Court of Common Pleas reduce county welfare costs.

Before installing the present system, the court used a batch-oriented Burroughs Corp. B4700 system, with much of the work handled manually. Al Simone, of the court's Domestic Relations Office, had been sitting at home nights trying to think of new ways to handle the child support payments system.

Simone manages a complex court system. When the court awards a support settlement following a marital breakup, the Domestic Relations section of the court is responsible for tracking down defendants, monitoring payments, mailing checks and answering as many as 125 written complaints per day. In 1977, the court's case load totaled 8,000 — and it is still growing.

The old system posed especially severe problems concerning complaints by plaintiffs that their former spouses were falling behind in payments or otherwise failing to live up to the court settlement. When a complaint came in, it might take 15 minutes to half an hour to locate all the required information — with the time increasing as the year wore on and payment histories grew longer.

Even then, according to Simone, the *total* history of the defendant's payment record might not be easily accessible — and payment history is the crucial variable in determining a complaint's validity.

Multiply 15 minutes times 125 complaints per day, then project a doubling of the case load by 1980, and the reason for Simone's concern becomes evident.

### Cutting Welfare Rolls

At the same time, Simone wanted to meet the challenge of cutting welfare costs offered by a new federal law, PL 93-647. This law, passed in 1975, provides for incentive and reimbursement payments to states and localities which actively try to reduce welfare rolls by locating absent parents and negotiating child support settlements with them.

The basic thrust of this law is to reduce the costs of the Aid to Families of Dependent Children (AFDC) program, which cost taxpayers $8 billion in 1977.

In Pennsylvania, state law provides authority to shift cases from the Department of Public Welfare to the court system so that a support settlement may be reached, thus fulfilling the intent of PL 93-647.

If the capability to process AFDC cases could be expanded while maintaining the ability to handle existing case loads, Simone believed he could qualify for payments promised under the law. These payments would assist Simone's office in the transition to a new file management system.

### Two-Fold Challenge

There was, therefore, a two-fold challenge, Simone recounted: the challenge of earning federal funds by handling AFDC cases and the challenge of

(Continued on Page SR/25)

## *Imagination the Only Limit*

# Shortcuts to DP Cost-Cutting Revealed

By Drawoh Netrak
Special to CW

Forget all the goody-two-shoes stuff you'll read in the rest of this special report. Here are some of the more creative things my company did — before forces entirely beyond our control drove us to bankruptcy — to cut DP costs.

Renting lines from Ma Bell is expensive. You know that, right? One thing you can do is to hire "phone phreaks" to make free long distance calls for you.

If you get caught, you can blame them and claim innocence. With luck (and shrewd lawyers), it'll be years before Ma Bell gets a judgement out of you. Joe ("The Eel") Johnston, before he was disbarred, kept the phone company from each of his clients' doors for an average of five years.

Another means, which will incur far less liability, is to connect two frozen juice cans with a piece of string. (Drink the juice first.) If you find the bandwidth on that system, which we called Communications and Network System, is inadequate, use bigger cans. Some users are reportedly using 46-oz. V-8 juice cans with 11mm climbing rope.

I've heard reports that a certain high-technology company in Silicon Valley is experimenting with two 55-gallon drums connected with 2-in. steel cable, although insiders say that early versions of this system were plagued with a tightrope-walking Frenchman.

Another system, believed to be in use by some state and local goverment DP departments, uses carrier pigeons to carry data. In this method, though, other factors reportedly eat into any

(Continued on Page SR/12)

## Inside

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# Package Monitors Disk Pool, Frees Up Space

**By William L. Johnson**
Special to CW

MINNEAPOLIS — Because savings in personnel costs are sometimes debatable and equipment freed for other uses is not always easy to value, I am reluctant to say exactly how much my company saved by using an automated space management package. I can say with confidence, however, that the software package has easily paid for itself since we installed it.

By giving us better control over data sets on disk, the package saved us the cost of at least two full-time employees, as well as the cost of three spindles of IBM 3350 disk storage.

At Prudential Insurance Co.'s North Central home office here, we have experienced a rapid growth in DP capacity in the last few years, particularly in the area of direct access storage. In a two-year period, we grew from two IBM 370/155 mainframes and 40 spindles of 3330 disk storage to twin 3032 processors and 96 — that's right, 96 — spindles of native-mode 3350 storage.

During this period, the DP department had attempted to cope with the management of disk resources with a number of locally developed report programs that listed disk space allocated, free space, inefficient block size and so forth. One full-time employee spent many hours each day reacting to user requests for disk space and attempting to recognize and delete old data sets to make more space available.

*'There were two main requirements for the package: it had to be easy to use and it had to have the ability to enforce user standards automatically without the need for much JCL preparation.'*

The end result of this activity was a continuing space shortage and disk growth of more than 25% annually.

Faced with two choices — buying more spindles or getting a better handle on how the current space pool was being used — DP management began a search for an automated space management package.

There were two main requirements for such a package: it had to be easy to use and it had to have the ability to enforce user standards automatically without the need for large amounts of JCL preparation.

It also had to be flexible enough to accept any combination of standards that could be developed to properly manage the disk pool. We were under a mandate from our home office to develop those standards.

We evaluated several packages. While each performed similar functions, only one met the requirements for enforcing standards. That was the Pac/Master package marketed by CGA Software Products Group in Rockville, Md.

Pac/Master's facilities include a selection language that allowed the user to select a wide range of reports tailored to individual needs, an enforcement manager to carry out the actions requested by the user and an automated table of waivers to give the user control over data sets that were legitimate exceptions to the standards.

We installed the package the same day it was received. After some preliminary testing and familiarization, we began to design a set of standards that would provide the best payback in terms of available space.

Using the report selection capability of the package, we created a profile of the data stored on our disks. These showed that 85% of all data sets were sequential, with the remaining ones divided among partitioned, random and indexed-sequential organizations. This meant we should direct our efforts to optimizing the use of sequential data sets.

A second pass with the package showed us that the two biggest problems were unused data and overallocated data sets. This led us naturally to our first two standards: any sequential data set unused for 120 days would be scratched, and any sequential data set overallocated by at least one track would have its unused space released.

### Standards Committee

To implement these standards, however, and determine the impact of their enforcement, a DP standards committee was formed. It consisted of representatives of the user community and was chaired by the DP department.

One of the committee's recommendations was to develop the waiver system for bypassing the rules in data sets that merited legitimate exemption.

The first processing of Pac/Master and the subsequent enforcement of the standards resulted in a total space gain of three 3350 native-mode spindles. Approximately 20% of all sequential files were either scratched or had excess space released. Under the old manual system, it would have taken weeks, if not months, to accomplish this.

Standards are now enforced on a weekly basis, so there is a minimum of wasted space. In addition, data center management has also begun to use Pac/Master to monitor the disk pool to detect changes in the overall data profile, to determine if other efficiency standards should be developed and to calculate their payback in terms of more efficient usage.

*Johnson is a senior computer systems analyst with the Prudential Insurance Co. in Minneapolis.*

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## *Unit Costs Must Be Set*

# Financial Accountability Still Not Here

**By James A. Graham**
Special to CW

Data processing is no closer to establishing true financial accountability within companies today than it was 20 years ago.

This situation exists despite continuing efforts to cut costs is all areas and gain better control of DP. The goal of companies to control costs and maximize return on investment (ROI) not only will *not* be achieved in the short term, but may be further imperiled by the increasing emphasis on communications and user access to corporate data bases.

Part of the problem is that both general and technical management have been unable to come to terms with each other and find a common vocabulary and common set of principles.

As a result, DP and communication costs will continue to grow (frequently unchecked) until such time as DP management accepts that EXCPs and megabytes of storage are not the products being provided to an organization.

Likewise, general management must accept that the computing and communications facilities are finite resources, the costs of which must be identifiable with an end product or service.

While there will always be a need to analyze alternative acquisition methods and improve programmer productivity, financial responsibility and accountability will not be achieved until DP management can define its products(s) in a manner that allows the general (i.e., user) management to identify a cost-value relationship.

### Changes in the Ranks

To achieve this within a DP organization, a number of fundamental changes must occur within the ranks of both DP and user management.

First, DP management must recognize that while a production or marketing manager may be interested in the costs of inputting, creating and producing a build schedule or an order, the same manager has little interest in the technical data needed to produce the same product. (When was the last time that a DP manager was asked to reduce the number of keystrokes on a purchase order?)

Second, general management must recognize that DP is not the creator of costs, but primarily a provider of resources necessary to meet user-defined needs. (When was the last time that a production manager refused to produce additional products because of increased departmental costs?)

Third, analysts must place greater emphasis on evaluating the cost impact of alternative methods of providing necessary services, as well as identifying the true costs of processing. (When was the last time that a systems analyst was able to show either a product unit cost or processing costs at varying rates of production and usage?)

### Technical Isolation

The DP community is certainly not blameless, and it must accept the greatest burden for having focused its attention on building a base of technical expertise to the exclusion of defining its relationship and contribution to its organization as a whole. Just as industry implemented and refined product-costing techniques during the early 1900s, the time has arrived to define the unit costs for processing data and to establish accountabilty for the costs.

If these steps are taken, the results, I believe, will be surprising. The corporate DP function can be held accountable for maintaining, or perhaps even reducing, the unit costs of production. Users will be able to relate DP costs to the other costs of doing business, and DP costs will be forecastable in direct relation to the growth of business.

Although the transition time is lengthy, the time has arrived to recognize that computer and communication facilities are not wondrous "black boxes," but simply one more of the many tools available to control the direction and growth of an organization.

Perhaps I'm totally wrong. After 15 years in DP, I must concede that perhaps both DP and users would rather maintain the status quo.

After all, it's easier to point a finger than to accept accountability.

*Graham is a consultant with the consulting division of Boeing Computer Services, Inc., in Seattle, Wash.*

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## *Acquires Disk Management Package*

# DP Center 'Grows Up,' Gives Up Independence

**By Larry Cornellison**
Special to CW

EL SEGUNDO, Calif. — Given enough time, money and resources, I believe any DP center can code anything. But how many of us have that capability?

In our case it took us a few years, but we learned that we can, and in some cases should, be less independent than we thought we had to be. In particular, by buying a disk space management system from an independent vendor, we solved many problems and stretched our budget.

> *The area that had received the least attention during our growth years was our disk storage resources. We evaluated our disk use, and the findings were awesome . . . . Clearly, our basic disk philosophy had to be changed. We could no longer afford the luxury of using disk drives as "on-line dead storage" devices.*

The data center of the Space and Communications Division of Hughes Aircraft Co. is just six years old, but it has grown rapidly. Back in 1973, we thought the computing power of our IBM 370/158 was all the power we would need for the foreseeable future.

Ours was an open, general-engineering, batch environment that ran 400 jobs per week. As time passed, we saw a need for some sort of system to archive our disk data sets. Because we had the time and the personnel, we developed our own disk-to-tape archive system. (I wonder how many of these home-grown systems there are in the U.S.)

No effort was put into managing disk space, and no energy was expended worrying about data set placement on disk packs. If a user needed a disk data set, he allocated it himself, and when it was no longer needed, the programmer deleted it or archived it to tape himself for future restoration.

### Early Years

At this point, we were young, aggressive and, above all, independent. When we wanted something for our users, we coded it. If we wanted the operating system modified to suit our needs, we changed it. We were good at what we did, and we saw this quality reflected in the smiling faces of our users.

During those early years, we added TSO to the system, then APL and then a home-grown, on-line production inventory control program. It became obvious to us that we needed more disk space to support the expanded machine use, so we brought in more spindles. They filled up, so we upgraded to IBM 3330-II drives. Then they filled up.

With the proposed addition of IBM 3350 disk drives to the system, we said "stop." In five years, we had never said that. Was this the start of our own maturation?

We had grown in the following manner: from a 1M-byte 370/158 to our present 6M-byte 370/158 AP; from zero to 80 terminal users; from 800M bytes of disk storage to over 5G bytes; and from 400 jobs per week to more than 7,000. Clearly, it was time to make our operation more formal.

'Do You Have Any "Sorry Your Program Bombed" Cards?'

The area that had received the least attention during our growth years was our disk storage resources. We evaluated our disk use, and the findings were awesome.

Many data sets had not been accessed in four years; 2,400 data sets had not been accessed in more than 18 months; many were misallocated; and so forth.

We found that one user's data sets had been allocated 6% of our disk space, had not been accessed for at least six months and were all logged under a closed billing number. This user wasn't even getting the token storage bill.

Clearly, our basic disk philosophy had to be changed. We could no longer afford the luxury of using disk drives as "on-line dead storage" devices.

### New Disk Policy

We set up a policy for disk usage. It had to:

- Be easy to use.
- Require little or no reworking of projects.
- Be clearly defined.
- Be enforceable.
- Be enforced.

After several months of "user manual" study in which we considered some of the more powerful disk management software packages, we decided to evaluate DMS/OS, marketed by Software Module Marketing of Sacramento, Calif.

One of the particularly valuable aspects of the package was the ability to archive old data sets. The package allows for both implicit as well as explicit archiving.

Having used the package for some time now, we see several very definite benefits.

First of all, the package paid for itself in terms of data set and disk pack usage. We freed up four 3330-II drives; in addition, we free up an average of one pack per month by using the package to pinpoint unused data sets. That's in addition to freeing up work data sets left behind on some packs.

Our users are much happier now that we have a good set of standards for disk pack usage — it's easier for them to use the system. And we've saved approximately 30 man-hours per week that were formerly devoted to analyzing listings for expired data sets.

*Cornellison is a project engineer for Hughes Aircraft Co.'s Space and Communications Division in El Segundo, Calif.*

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### *Throughput Increased 20%*

# On-Line Package Helps Freight Airline Take Off

Special to CW

NEW YORK — An on-line programming package has helped a user here get "more bang for the buck" by freeing disk space and increasing mainframe throughput by an estimated 20%.

When Cliff Olsen, senior communications analyst for Seaboard World Airlines, Inc., originally went shopping for an on-line programming system, he knew what he wanted. In his 10 years of technical experience, Olsen has honed his philosophy for selecting software.

"First, I didn't want to buy any software package that locked us into a particular vendor and its products or services. No matter what the package is, I always look to see how easy it is for us to get out of.

"Second, even though Seaboard — the world's second largest freight airline — was essentially upgrading to a totally on-line environment, we still needed a batch system in the event the on-line system went down. We wanted to be very certain we had a quick, dependable, secure method for backing up our files.

"Next, I look at each vendor to see what quality of support I can expect. Then — and only then — do I evaluate the ease of installation and use of the package."

Although most people don't necessarily think of those criteria in that order, it is a logical one, Olsen maintained, since each point really hinges on the previous one. For example, installation headaches and ease of use often depend on vendor interest and support, he noted.

Seaboard's corporate offices, located just inside the John F. Kennedy Airport here, house the firm's IBM 370/145. That system, running under DOS/VS, is supported by six Memorex Corp. 1377 terminals, three remote terminals and a technical staff of 14. Six Memorex tape drives and six Memorex disk drives complement the 1.5M-byte system.

### Entry Time-Sharing System

As an IBM user, it was obvious to Olsen to look to IBM for software also. So he initially decided to rent IBM's Entry Time-Sharing System (ETSS) on a monthly basis for on-line program development.

Within seven months, however, he could no longer justify its use. "First of all, there is no good batch library system with ETSS," Olsen explained. "It was just too difficult for us to use when the system went down.

"Also, ETSS requires its own partition, and for us that meant maintaining a separate partition for on-line development. But when the ETSS partition was given the highest priority, it slowed down the throughput of the whole system. And when not given a high priority, response time was only fair.

"Suddenly, our on-line program development system was becoming impractical."

To overcome these difficulties, Olsen began looking for a similar product from a proprietary software vendor. He finally found one from National Computing Industries, Inc. (NCI) that seemed to meet his criteria. The package was called On-Line Without Limitations (OWL).

Olsen called NCI about the product and found he liked the features of the OWL package. Not missing a trick, the vendor took the opportunity to mention its product called Slick, a batch library system that worked with OWL.

"With Slick, we have eliminated all the private program maintenance and source libraries stored on cards in desks and file cabinets. We have also eliminated our own in-house program library system," Olsen noted.

"And with our present hardware," Olsen continued, "we have enough space for 1.75 million card images, which is more than we need. Suddenly, our first and second criteria had been met. We had found an excellent on-line system with an equally good batch system, which were both flexible enough to give us lots of options."

In addition, Olsen is pleased with the easy fallback capability the system gives him. "For example, if we are on Version 10 of a program and the system goes down, we can easily call up Version 9, access it and be on our way.

"Coupled with up to nine multiple password levels, this means OWL gives us a lot more security and reliability than ETSS or other packages could offer," he added.

Vendor support — an important consideration for Olsen — has also been excellent, he commented. "Any major problems are always solved with a technical rep over the phone — and they never hang up unless I am completely satisfied. With hardware vendors, support and technical competence are sometimes so poor that I have actually had to read to them from their own technical manuals."

The savings from installing OWL have fallen into two areas: tangible and intangible. The tangible aspect is a cost savings of less than $1,000 per year, although mainframe throughput has increased substantially. "I don't really know how to put an estimate on the 20% additional throughput," Olsen said.

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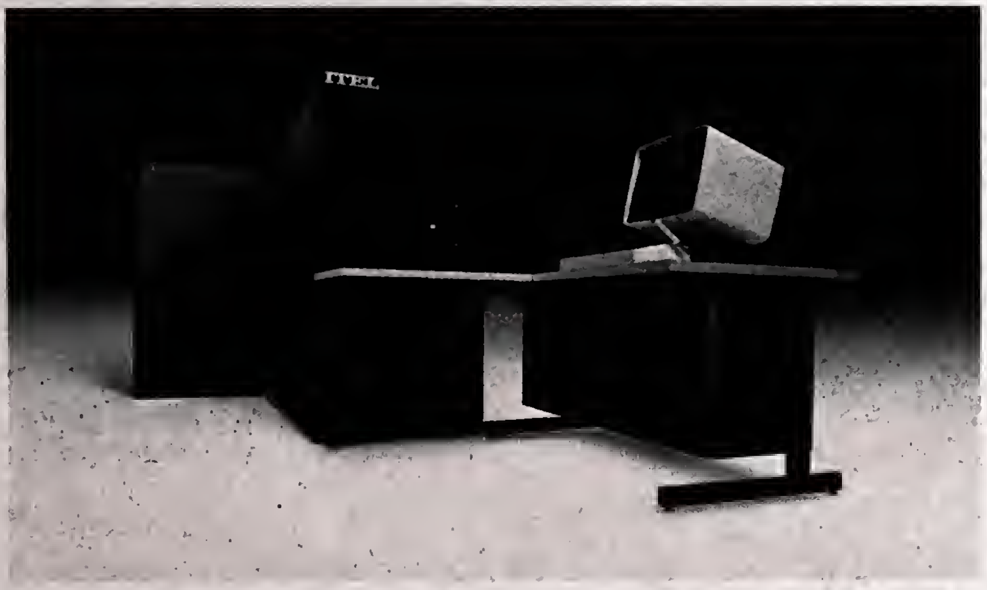

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# Printer Presses Big System Into Tight Budget

*(Continued from Page SR/2)*

Now we were finally ready to run the cable — an estimated 5,000 to 6,000 feet — connecting each of the terminals to the multiplexer channel of the computer. To avoid buying expensive, premade cables, we bought spooled wire, crimp-on RS-232 connectors and a device to connect the wire to the plugs (connectors).

### Cutting Labor Costs

We waited until we had some downtime within the plant and put some of our very talented employees to work stringing cable. We already had conduits in place under the parking lot, and the cable was pulled through those conduits and throughout the pressroom and other areas of the plant.

Rather than using expensive electricians to do this work, we again cut down on labor costs by having our employees do it.

Once the cables were in place, we attached them to the connectors. We had done an exhaustive telephone search for a crimping tool and came up with one for $175. At this price it wasn't cheap, but it nevertheless saved us numerous hours of working with soldering irons and stringing extension cords into otherwise inaccessible areas of the plant.

After installing 100 or more connectors in ceiling attics, behind presses, behind desks and at the computer itself, the tool has undoubtedly saved us a few thousand dollars — not to mention the labor expenses we avoided by not hiring an electrician for this work.

A large number of the connectors and some of the wiring were done by one of our delivery drivers who had a broken arm. He would otherwise have been put on disability.

Since we are not a union shop and had not contracted with any union organization to do this wiring, there were no union problems to be encountered. However, all the 110v and 220v wiring that was done was performed by qualified electricians.

### Games and Accidents

Even after the system was operating — at least nominally — we weren't out of the woods. We noticed that some of the keys on the plant terminals were being pressed indiscriminately in a "let's-see-what-this-does" type of fashion, causing unwanted data, program breaks and screen clearings.

To stop this as well as prevent the legitimate accidents that we knew occurred, we determined that we had to disable approximately eight keys on the keyboard.

The Soroc terminals have a keyboard in which two contacts are split by a piece of plastic when the key is not depressed. Pushing the key causes a piece of plastic to be removed from between these two contacts, so the proper signal can be generated.

To solve this problem, we first removed the plastic keys, exposing the workings under them. We cut a piece of 1/8-in.-wide plastic label-making tape and pushed it between the contacts, with the tape backing still in place.

Now, even though the plastic built into the key is removed from between the contacts when the key is pushed, the tape stays in place, so pressing the key has no real effect.

The beauty of this method is that by removing the tape, the keys will work again — something not possible if we had severed the keys' leads.

### Final Problem

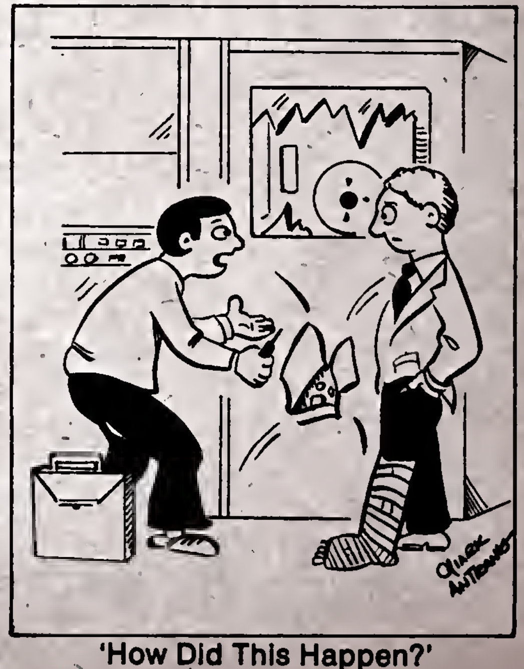
Now, we were down to our final problem. One of the non-Soroc terminals we had was a Diablo Hytype II, used for writing letter-quality reports, invoices and letters.

Shortly after putting up our system and trying to write our first output to the Diablo printer, it became apparent that we needed a spooler to handle output from many locations within the company. Thanks to the HP users' group publication, we bought a software package called T-Spool which would spool output to any RS-232-compatible device using a call to a previously prepared routine.

Initially, we had thought it would cost us about $1,000 to get this package written. Surprise, surprise: it cost $15, including the cost of the magnetic tape on which it was delivered and the documentation. Even though this was not one of my highest dollar savings, I consider it to be one of my more outstanding bargains.

We have now been operating for one year and are pleased with the performance of our tight-fisted system. Our approach may have been unorthodox, but our results have been well worth the effort.

*Crispin is director of customer service for Interweb.*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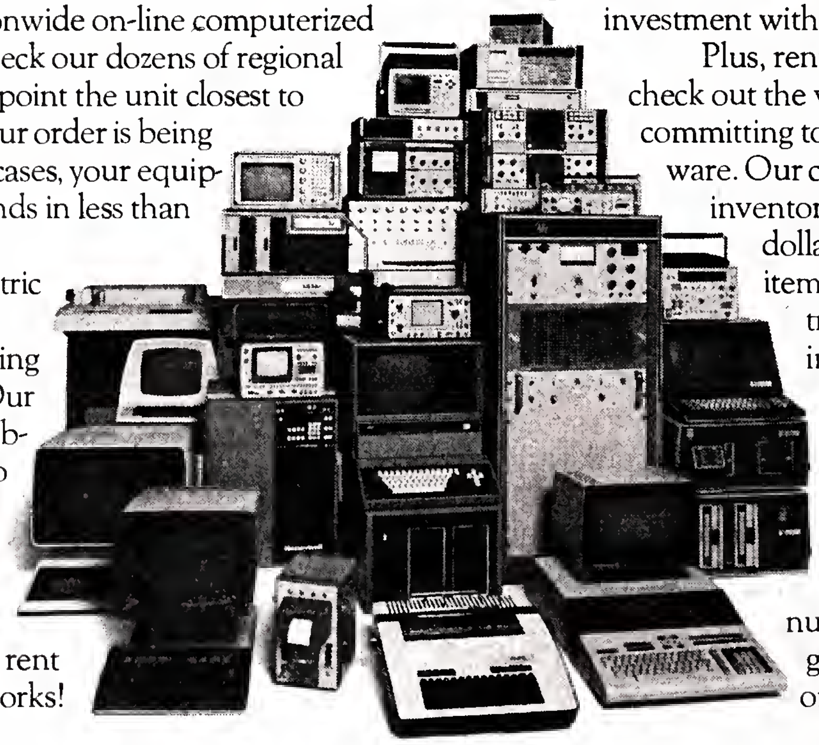

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# Creative Routes to DP Cost Cuts Revealed

*(Continued from Page SR/2)*

savings that have been gained.

Another method for saving money was perfected by Ma Bell in its distributed processing system: get your customers to do some of the work. For example, if you pass out customer surveys that will later require coding of responses for keypunching, give customers the code conversion table. Make them punch their own cards.

Even better — require customers to send in their information in the correct format on cassette tapes. If they complain they don't have the necessary hardware, offer to sell it to them at an attractive price.

Think of the marketing opportunities for your company. You could even get to be president of the new division.

Stock forms are expensive, and many installations carelessly discard them when they've been printed on one side. Print on both sides.

If you can't get a stack of paper that is long enough this way; hire someone to glue the edges together to give you the equivalent of one box of continuous forms.

Maybe you can do away with paper altogether. For example, suppose you sent your monthly customer statements on microfilm. If customers complain, offer to sell them inexpensive microfilm readers — there's another golden marketing opportunity.

While we're on the subject, why stop there? Offer your customers "the very best": a CRT right in the home, connected to your installation by dedicated line. Do what many businesses like to do — get your customer to assume the risk and pay for the privilege.

### Mainframer Conspiracy

Equipment acquisition, too, offers dollar-saving opportunities. For example, it is not widely known, but there is a conspiracy among mainframers in this country to keep from the market computer kits with the power of mainframes.

Fortunately, this conspiracy has not been 100% successful, and a careful reading of such popular publications as *Home Computer Builders Monthly, Popular Quantum Mechanics, Customer Engineer Mate* and the more scholarly *ERIII Transactions Hindquarterly* will reveal ads for kits with the power of an IBM 3033.

Investigate them. These can be excellent buys, and they're not all that difficult to put together. The latest reports show that five people working diligently can complete the kit in well under a year. Think of the savings!

### Rock-Bottom Price?

If you've tried these methods and failed, don't give up. There are still opportunities. For example, most vendors stick to the absurd fiction that there is a company price list that represents absolute rock-bottom minimum. Balderdash!

You know how hard your vendor's salesman works for you; reward him with a night out on the town. Get him a professional companion for the evening. He's probably been working too hard, anyway, and deserves some fun.

When the pictures are developed, schedule a meeting with him. Now, what was that he was saying about rock-bottom prices?

Some salesmen may be resistant to this precise method. Try variations on the plan outlined above until you hit on a formula that works.

Many DP managers fail to realize that there is a golden opportunity for them right in their own backyards, since many companies keep their budget data on the computer. If you don't have enough skill at this point, enroll in a course in creative bookkeeping at your local college.

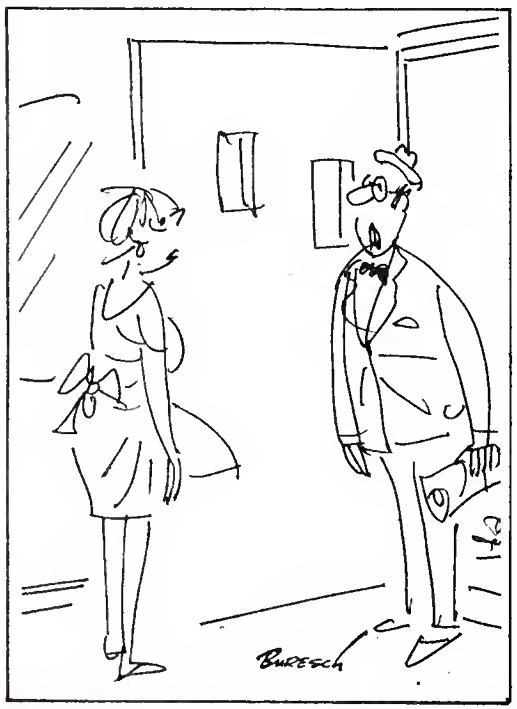
If you haven't figured out by now exactly how to use this idea, resign from your organization and go open that liquor store you've always dreamed of owning.

Popular inspiration has it that all great ideas begin with a simple phrase: "I'll try." Look for methods that haven't been tried before.

For example, you know how expensive disk packs are. Maybe you can make your own by stretching a trash bag very tightly over an LP record. Use rock music for this; classical recordings are frightfully expensive.

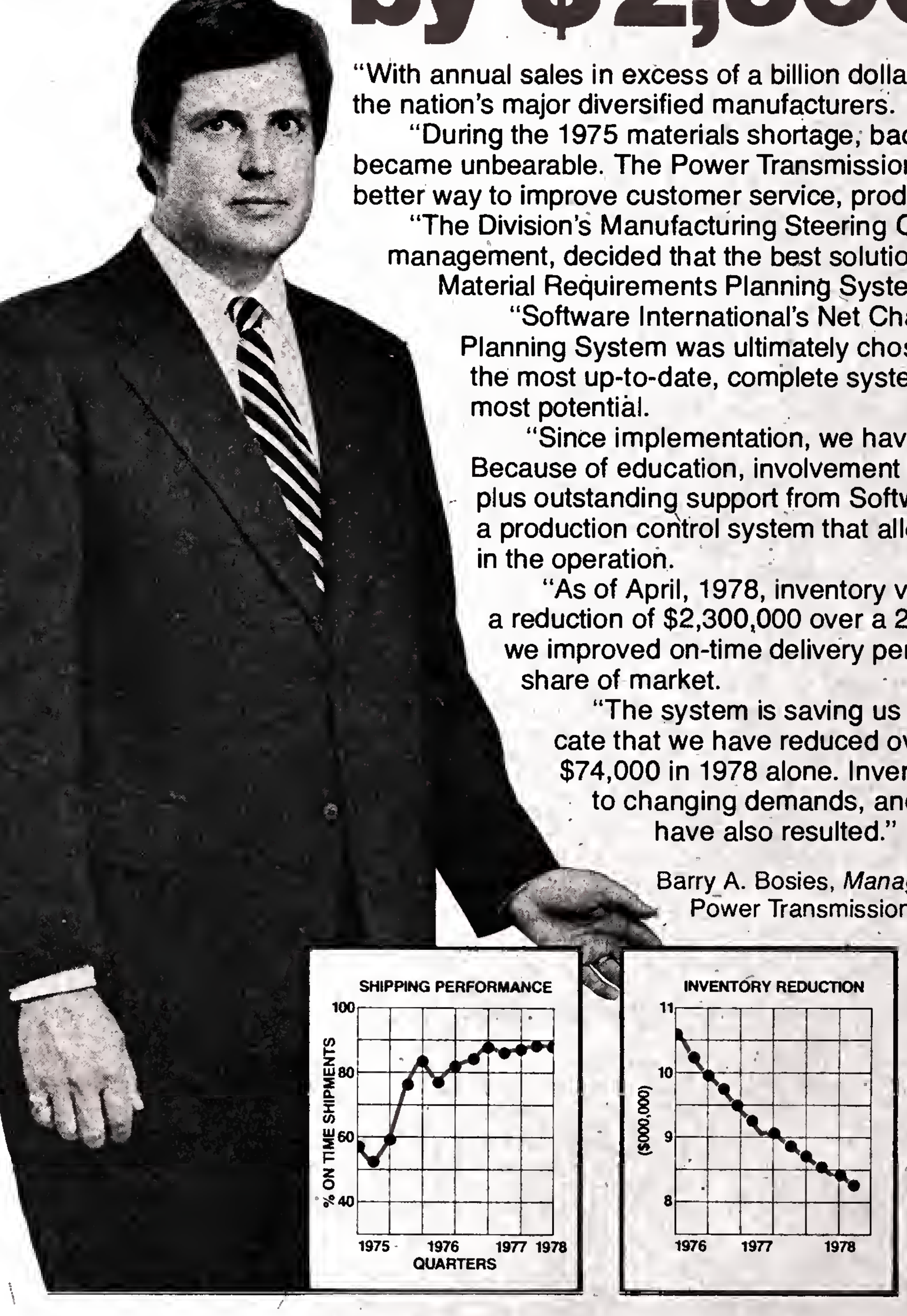
In sum, the opportunities are limited only by your imagination. I've used many of these methods in the past, often with great success.

*Netrak, who recently retired after a 40-year career in DP, has worked in the past for such well known firms as the Pennsylvania Rail Road, the* New York Herald Tribune, *W.T. Grant and Studebaker Auto Co.*



I've Been Replaced by an Abacus.'

"Koppers Company's Transmission Division Reduced Inventory by $2,300,000!"



"With annual sales in excess of a billion dollars, Koppers Company, Inc. is one of the nation's major diversified manufacturers.

"During the 1975 materials shortage, backlogs ballooned and leadtimes became unbearable. The Power Transmission Division knew there had to be a better way to improve customer service, productivity, and inventory turnover.

"The Division's Manufacturing Steering Committee, consisting of upper management, decided that the best solution would be the installation of a Material Requirements Planning System.

"Software International's Net Change Manufacturing Resource Planning System was ultimately chosen because it was felt that it was the most up-to-date, complete system available and the one with the most potential.

"Since implementation, we have shown measurable improvements. Because of education, involvement and commitment at all levels — plus outstanding support from Software International — we developed a production control system that allows participation by all departments in the operation.

"As of April, 1978, inventory value was reduced to $8,300,000, a reduction of $2,300,000 over a 20-month period. At the same time, we improved on-time delivery performance, thereby gaining a larger share of market.

"The system is saving us money; performance measures indicate that we have reduced overtime significantly with savings of $74,000 in 1978 alone. Inventory accuracy, faster reaction to changing demands, and Bill of Material accuracy have also resulted."

Barry A. Bosies, *Manager, Production Control*
Power Transmission Division, Koppers Company, Inc.

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## *In Wake of IBM 4300 Announcement*

# Third-Party Marketplace Can Fill Interim Needs

**By Edward Cherny**
Special to CW

Despite the excitement and ferment in the industry caused by IBM's announcement of its 4300 series, the third-party marketplace is not dead. Users can still solve their problems economically by considering this alternative.

The bulk of the 4300 series systems will not be shipped before the third quarter of 1980, and even then some users will have to wait nearly three years before receiving their systems. These facts have caused many users to turn back to the third-party marketplace — temporarily frozen following IBM's announcement — to solve their interim DP needs.

The result of this activity has been an increased demand for IBM 370s in the third-party marketplace. Because of the limited availability of used 370s, both lease rates and purchase prices will be forced upward over the next one to two years. This is simply a reflection of the law of supply and demand.

*Because of the limited availability of used 370s, both lease rates and purchase prices will be forced upward over the next one to two years. However, prices for this equipment are still advantageous for the short-term user.*

However, the prices for this equipment are still advantageous for the short-term user and should begin to level off when IBM starts to ship the 4300 systems.

IBM's announcement that the 4300 series is two and a half to three times more powerful (on a price/performance basis) than comparable 370 systems and that the series will be available from IBM under a two-year lease plan has had a dramatic impact on the third-party marketplace.

### Pricing Strategy

The firm's aggressive 4300 pricing will cause many end users to buy, and not lease, the new machines. By setting the purchase price of a 4331 in the $69,000 range and the 4341 in the $250,000 range, IBM has substantially reduced the opportunity for normal profit margins for the third-party marketplace this year because its prices are so low.

In addition, its two-year lease plan may discourage users from entering the third-party marketplace, where lease plans traditionally start at four years.

When comparing the price and performance of a 4341 at $250,000 with that of a 370/148 with an original purchase price of $450,000 (and now trading at approximately 60% of the list price), it is clear that the sheer dollar volumes are not available to the third-party industry on the new levels of equipment.

If, for example, in the dealer market, the average industry markup for handling these transactions over the past five years had been about 10%, one can see that for the 5% to 10% earned in handling a 370/158 or 168 in the current market, sheer dollar volume will be substantially reduced when the 4341s start trading in the used arena. It will become tougher for this market to do business.

### Adjustment Necessary

The third-party industry will have to adjust to remain competitive, and the result should be significant savings to the end user purchasing IBM mainframes and peripherals. Necessary changes in planning and pricing should strengthen the larger firms, while the fringe brokers, who until now have survived only because of large demands and high pricing, will begin to fall off.

It is the larger firms that have the resources to handle large volumes, and it is therefore tougher for the smaller firms to spend the amounts necessary to make money.

End users apparently thrive on the kind of preannouncement paranoia that was exhibited prior to the 4300 announcements. Prices were recently reduced on Series 30 memory and some Model 158 and 168 configurations, satisfying long-held expectations, and the rumors have already begun flying about IBM's anticipated Series H systems. Industry pundits and trade papers have even gone as far as publishing model numbers and anticipated prices for the new machines.

By allowing this much preannouncement discussion, IBM has succeeded in delaying user lease/purchase decisions. It has also put the user community on notice that many of the criteria used for past decision-making are no longer viable with the price/performance delivery curves of the new equipment.

*Cherny is president of CMI Corp., a third-party lessor in Detroit.*

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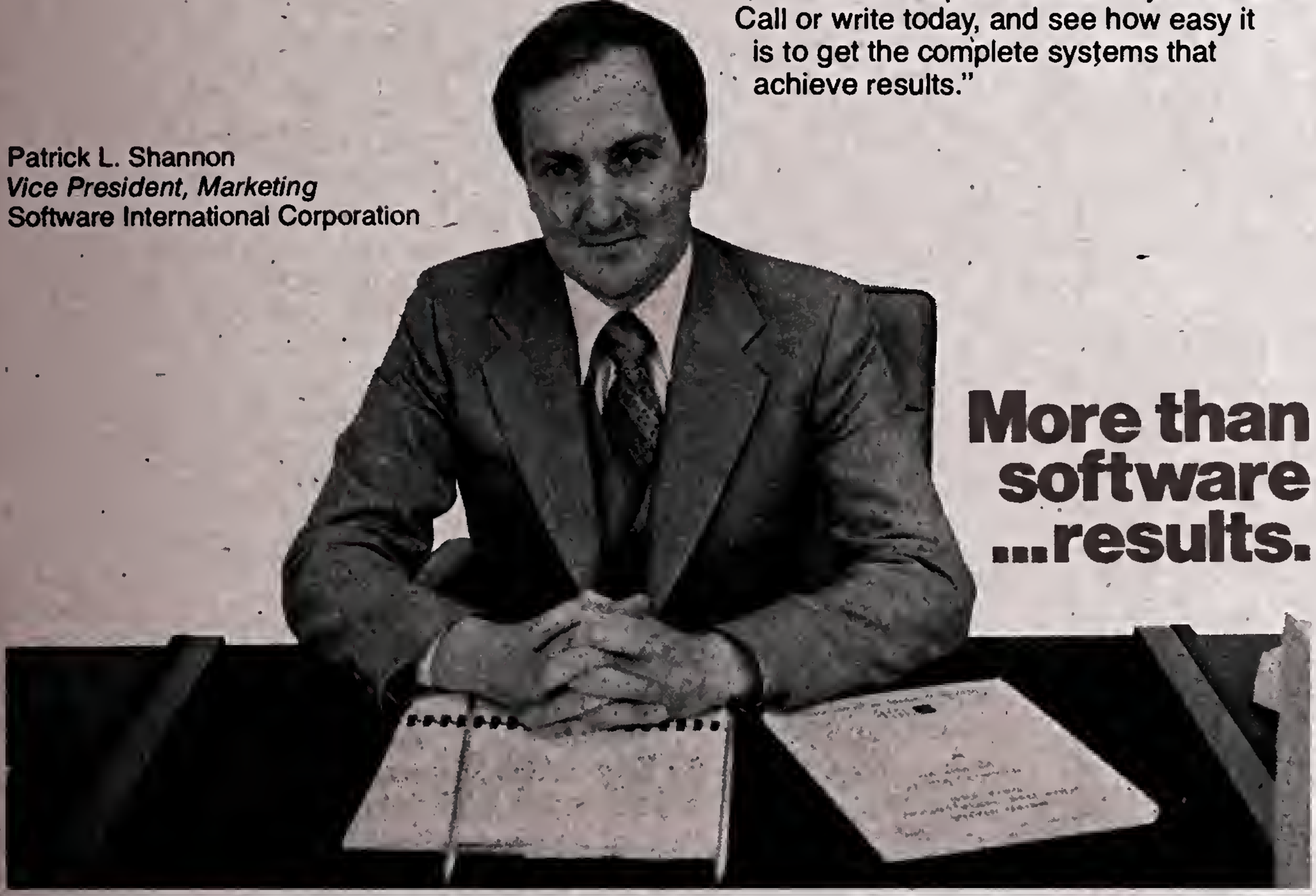
*Vice President, Marketing*
Software International Corporation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## *Consumables Costs Trimmed 80%*

# Insurer Scraps Impact Printers for Microfilm

Special to CW

NEW YORK — By replacing some of its hard-copy impact printers with an on-line microfilm printer, Metropolitan Life Insurance Co. here is saving an estimated $2,500/mo over its previous costs.

The firm, with more than 600 programmers and four major installations nationwide, generates more than 200 million lines of output per month, most of which rarely leaves the DP departments. More than one-third of that output — an estimated 70 million lines monthly — is put on microfilm, with more to come, according to Erich Korman, manager of capacity planning, standards and procedures.

"We have realized the materials cost savings we were aiming for," according to Korman. "The company calculates it breaks even at 20 million to 30 million lines per month, so the additional 40 million to 50 million lines of output on microfilm are 'profit,' produced at a cost of the consumables only, which is 80% less than the costs for paper."

To achieve this savings, the company brought in an Eastman Kodak Co. Komstar 200 microimage (microfiche) processor. The device attaches directly to the firm's mainframe and to the system, it is indistinguishable from a conventional on-line printer.

### Two Output Routings

Output from the firm's mainframe — a 12M-byte IBM 370/168 Attached Processor configuration — gets to the microfilm unit in one of two ways, Korman explained. The first method is for it to be assigned to microfilm via the familar SYSOUT routing. A special class of output has been assigned to microfilm, and using that class requires no special effort by a programmer.

The second way is somewhat more innovative. The firm runs VM/CMS, supporting a network of more than 200 terminals. Output can be held for a programmer within the system before it is printed. That way the programmer can review the output on a terminal before routing it to the microfilm unit.

Metropolitan has calculated that the "break-even" point for individual jobs is approximately 30 pages of output. That is, if output runs 30 pages or longer, it is more profitable for it to go onto microfilm, according to Korman.

Although the insurer is not doing automatic routing at present — letting the system examine an output file if it exceeds 30 pages — that could be done and, in fact, is under consideration, he noted.

### Improved Productivity

The microfilm effort has resulted in a slight improvement in programmer productivity over using the bulkier fanfold reports.

"The gains have been most significant for our systems programmers," Korman noted. "They often may be working with 50 to 60 different program modules while working with other programmers in similar areas. Their printouts can be large and awkward to handle. Some of our programs occupy 1M byte of memory."

In addition to working with multiple modules, the systems programmers must often make notes on listings. "They had been used to working from CRTs to increase their productivity and had already developed a habit of jotting notes on a pad," Korman observed. This method of working transferred well to microfilm.

The systems programmers, in fact, took to microfilm almost immediately. "They are more responsive to innovation, even though they were more inclined to make notes on paper than applications programmers. Applications programmers, accustomed to working with hard-copy terminals, also liked microfilm, but they were slower to make the change," Korman commented.

Even so, there were some programmers who were reluc-

*(Continued on Page SR/15)*

**"The choice was obvious... FORTEX! Their A/R system provided features beyond our planning and expectations."**

*Albert W. Paul*
*Data Processing Manager*
*Minolta Corporation*
*Ramsey, New Jersey*

"Minolta's accelerated growth rate had rapidly outmoded our semiautomated A/R system. A limited staff dictated finding a proven, operating package that would fulfill our needs and offer expansion capability. We limited our study to those systems with on-line capabilities, written in COBOL and using the DOS operating system. At this point, Data Processing and the Credit Department investigated the operational and functional characteristics of the remaining systems. The choice was obvious.

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# Do You Know How to Use Consultants Wisely?

(Continued from Page SR/8)

DP organization with very little documentation recognized its problem and decided to install standards in its shop. A consulting firm sold it a prewritten set of 20 standards manuals, requiring eight feet of shelf space, at a cost of $25,000. The effort failed and the manuals are gathering dust.

In this case, DP management failed to realize the limited capability of the organization to implement a project of this magnitude. To change from a situation with few standards to one with hundreds simply isn't practical.

Recognize the limits of your organization and the support required for a project. As a solution, this organization installed a dozen or so standards and concentrated on the process of installation and enforcement, and it worked. The cost: under $5,000.

**7. Listen to your own personnel.** This is the opposite of the special-knowledge situation. It is appalling how many times consultants have been brought into an organization to formalize what employees have been saying all along. This could be called a "common-knowledge" situation.

The people in your organization were originally hired because they had certain expertise. You should listen to them as you would to an outsider. Your employees have the experience and talent to solve many of the problems that are often turned over to a consultant.

DP directors and their managers often say that in-house personnel must conduct themselves professionally if they expect to be treated as professionals. To them, this means that employees must put some effort into a proposal if it is to be taken seriously.

A good proposal should include costs vs. benefits, a written project plan and so forth, presented in a clearly written, concise, reasonably nontechnical format. By dispensing with the "idea broker" — the consultant — an employee can improve his image as well as save budget dollars by eliminating the middleman.

In summary, as special-knowledge people, consultants can be a cost-saving resource to your organization. Like any resource, however, they must be controlled. Control starts with a plan containing a defined scope and a clearly stated set of deliverables that are within the organization's capabilities.

Develop specific policies to ensure selection and limitation of the appropriate consultant. Following these rules will save a large percentage of your consulting services budget, put you in control and, best of all, get you the product you want, when you want it.

*McGrael is president of Management Dimensions, a consulting company in Pomona, Calif.*

# Firm Goes To Microfilm

(Continued from Page SR/14)

tant to make full use of microfilm. To spur them to make greater use of the Kodak unit, the company monitored how many hard-copy lines vs. how many microimage lines each programmer generated. This enabled the company to pinpoint the reluctant users and make an additional effort to help them.

Unlike some installations, which generate a tape for an off-line COM unit, Metropolitan's system is on-line. This way, it takes only 20 minutes extra to get the microfilm to the waiting programmer.

The unit the firm is using processes 10,000 line/min with an integral, nonchemical, dry-heat method. This eliminates labor, as well as the need for personnel to attend the unit, Korman explained.

"Our programmers can have their listings within two hours. This eliminates long waits that eat up productive time," Korman stated.

There were other benefits besides the $2,500 monthly savings and the productivity changes.

"We've found that we not only achieved the cost savings that spurred the switch to microfilm, but we've made significant gains in access and turnaround time, space savings and data integrity," Korman said in summary.

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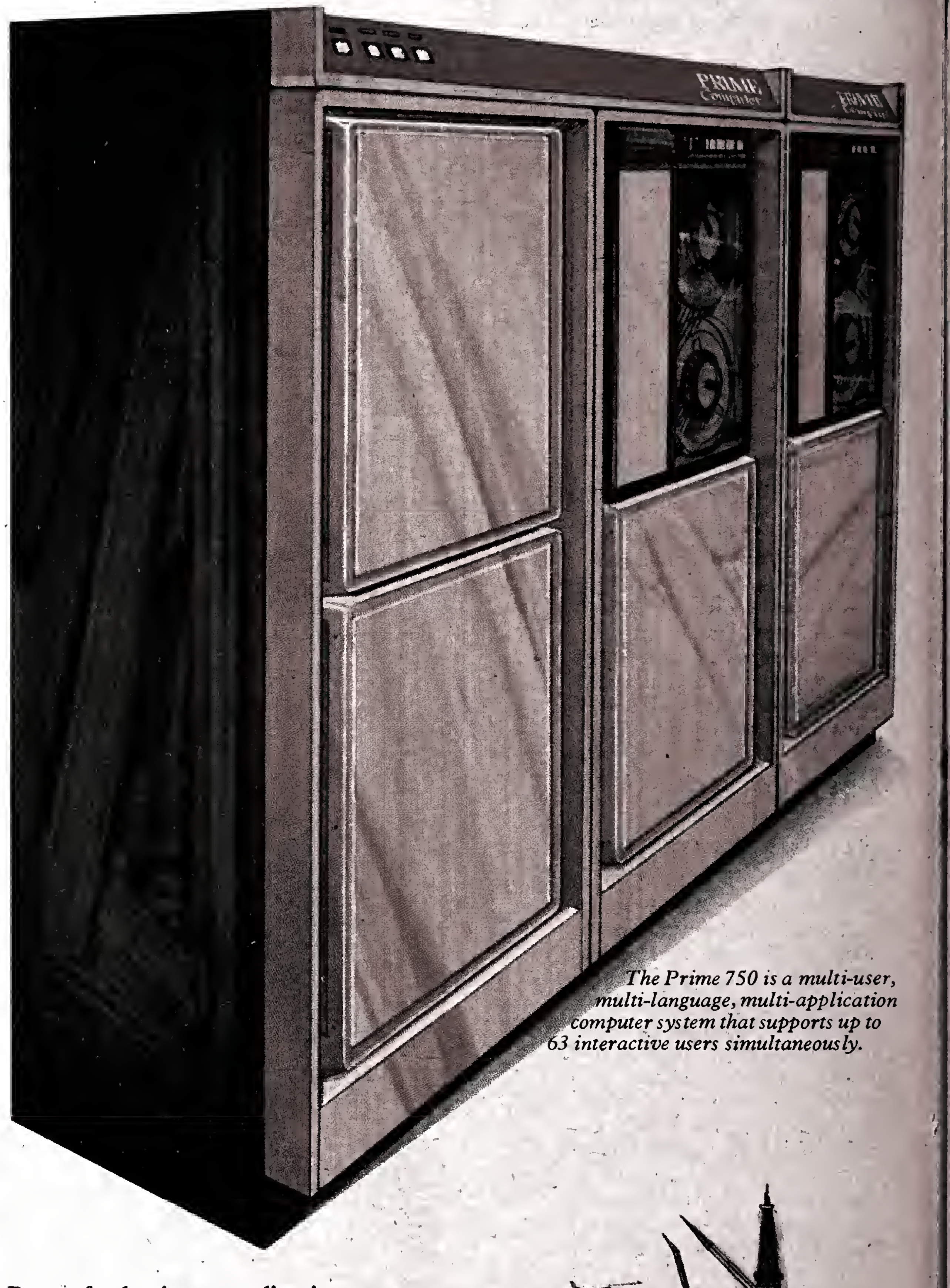
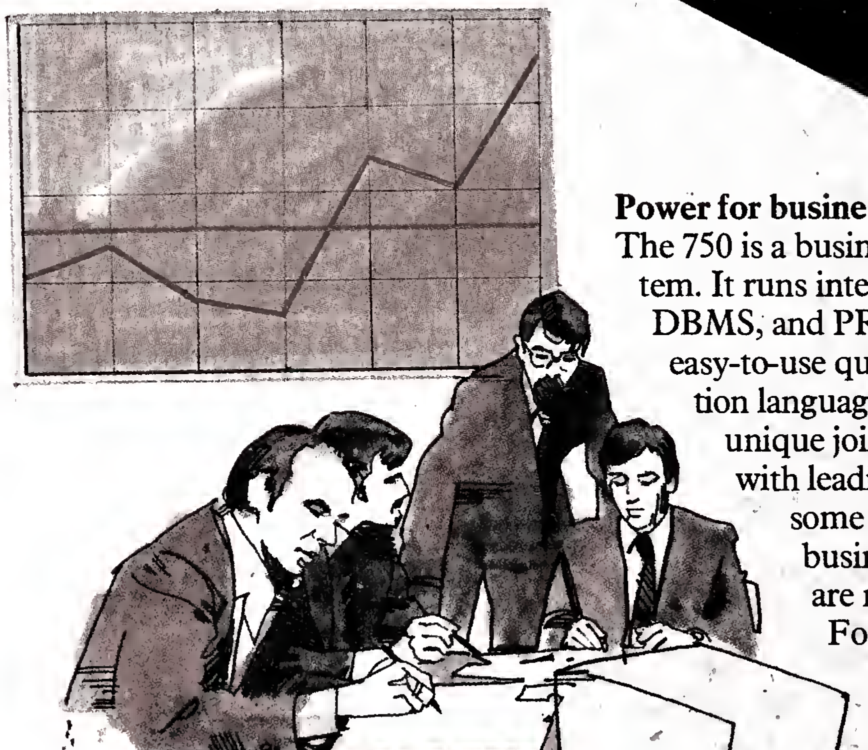


*The Prime 750 is a multi-user, multi-language, multi-application computer system that supports up to 63 interactive users simultaneously.*



*Sophisticated business modeling systems are among the packages available through Prime's joint marketing program.*

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*Big, number-crunching engineering analysis programs run interactively on the 750.*

# atility is power.

**For engineering applications**
The same 750 that runs your business programs can simultaneously operate as a FORTRAN system that thrives on hairy computational jobs. A growing list of the most demanded engineering software packages—most of which previously ran only on batch-oriented mainframes—can now run interactively on the 750. They include proven packages such as ANSYS and NASTRAN for finite element analysis, DIS/ADLPIPE for piping system design, and SCI-CARDS for printed circuit board layout and routing. Besides these joint marketing packages, there are dozens of others available through third parties and PULSE, the Prime Users Library.

*Prime's extensive distributed processing software and compatible family of computers let you put computing power where it's needed.*

**For distributed processing**
The 750 can also be a versatile building block in distributed processing networks, supported by one of the broadest ranges of distributed processing software available. PRIMENET,™our networking software package, allows local and remote communications on private lines, and is X.25 compatible for domestic and international packet switching as well. In IBM 3270 environments, DPTX, our Distributed Processing Terminal Executive, provides smooth, no-risk transition to distributed processing.

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*Advanced Prime engineering has made possible the 32-bit architecture and large virtual and main memory configurations that give the 750 mainframe performance capabilities.*

**One notable exception**
With all that it can do, there's one thing you can't expect to turn over to the 750: a big chunk of your data processing budget. The 750 is priced substantially lower than mainframe computers of comparable capabilities, it's a lot less expensive to install, operate, and support, and you can get prompt delivery. All of which can make you a lot more versatile in allocating your financial resources to get your job done.

For more on what the versatile and powerful Prime 750 can do for you, contact the nearest Prime office, or write Prime Computer, Dept. 5310, 145 Pennsylvania Avenue, Framingham, MA 01701.

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# Microfiche Saves $900,000 for Insurance Firm

By Deborah Aframe
Special to CW

DES MOINES, Iowa — Computer output microfilm (COM) turned a potential nightmare into a very pleasant dream for an insurance company here. It also brought savings of at least $900,000.

Preferred Risk Insurance Co., headquartered here, is divided into two companies: Preferred Risk Life and Preferred Risk Mutual. The former sells individual life, health and annuity policies, and the latter specializes in casualty insurance, including fire, home-owners and auto insurance.

*A longer version of this article appears in the September issue of the* Journal of Micrographics.

In 1974, Mutual realized that its system of keeping paper files for auto insurance was becoming unmanageable. It had 240,000 active auto policy files, which accounted for approximately 71% of its total paper files.

Keeping track of this paper presented a problem to the claims adjustment department and the policy service department, which handle telephone and written inquiries about individual policies. If a customer called the firm with an inquiry regarding a policy, the service person had to pull out the paper file, which was frequently misfiled. When the file was found, the needed materials were often missing either because of misfiling or because someone else was working on them.

Using this method, it took an average of about two days to respond to customer inquiries; as the number of policies grew, so did the number of lost or misplaced files. The firm realized it would have to drastically improve customer service in order to stay competitive.

## System Objectives

The firm decided that a new information handling and retrieval system had to be implemented. This system would have to meet the following objectives: faster access to policy information; simultaneous, multiple access to the information; more complete, accurate and timely policy information; faster access to a particular item of information within a file; and decreased use of paper files.

The firm hoped to meet these objectives while, at the same time, keeping equipment and programming costs at a minimum. It also hoped to limit and, ideally, reduce rising personnel costs.

Ease of use and simplicity of format were also important considerations in selecting a system, so that implementation would require as little disarrangement as possible.

The task of meeting the firm's information handling needs fell to the director of the DP department, Joe Ohnemus.

Analyzing the situation, Ohnemus found that each file folder contained the typical insurance information, such as the application, inspection report, motor vehicle report, diary information and change requests. Each time a file was needed to either retrieve information or change it, it had to be pulled manually, transported, inserted, stapled and refiled. Such an operation was clearly labor-intensive and left a wide margin for human error.

(Continued on Page SR/23)

| | |
|---|---|
| Equipment & Fees | |
| Automatic Viewers | |
| 7 units @ $2,975.00 | $20,825.00 |
| 11 units @ $3,075.00 | $33,825.00 |
| 1 Manual Viewer | 265.00 |
| Reader/Printer | 1,395.00 |
| Installation fee for automatic viewers @ $50.00 each | 900.00 |
| SUBTOTAL | $57,210.00 |
| Supplies & Material | |
| 1,610 Cartridges @ $12.50 | $20,125.00 |
| Cartridge Racks | 5,236.00 |
| Forms Slides | 135.00 |
| Reader/Printer Start Up Supplies | 110.00 |
| SUBTOTAL | $25,606.00 |
| Microfilm Conversion | |
| 746 Silver Fiche | $ 1,492.00 |
| 11,060 Copy Fiche | 1,437.80 |
| SUBTOTAL | $ 2,929.80 |
| GRAND TOTAL | $85,745.80 |
| Less 8% Discount | 6,859.66 |
| NET TOTAL | $78,886.14 |

Figure 1. Initial Investment to Implement Microfiche System

| | |
|---|---|
| COM Service Bureau | |
| Silver Fiche Originals | $2,440.00 |
| Copy Fiche | $2,338.70 |
| Monthly Maintenance of Automatic Retrieval Units | 450.00 |
| Consummables: (Lamps, Carriers, Reader/Printer supplies) | 200.00 |
| | $5,428.70 |
| X 12 Months = $65,144.00 Yearly | |

Figure 2. Recurring Monthly Expenses

| Area | Savings |
|---|---|
| Administrative Services | $70,350.00 |
| Data Processing | 50,112.00 |
| Claims | 66,000.00 |
| Policy Service | 16,008.00 |
| Auto Underwriting | - |
| Agent's Lists & Boards | 14,093.00 |
| Cash Lists | 6,661.00 |
| Reinstatement Limited Coding & Keypunching/Verify | 11,671.00 |
| TOTAL | $234,895.00 |
| Less Annual Systems Expenses | -65,144.00 |
| NET SAVINGS | $169,751.00 |

Figure 3. Summary of Estimated Annual Savings

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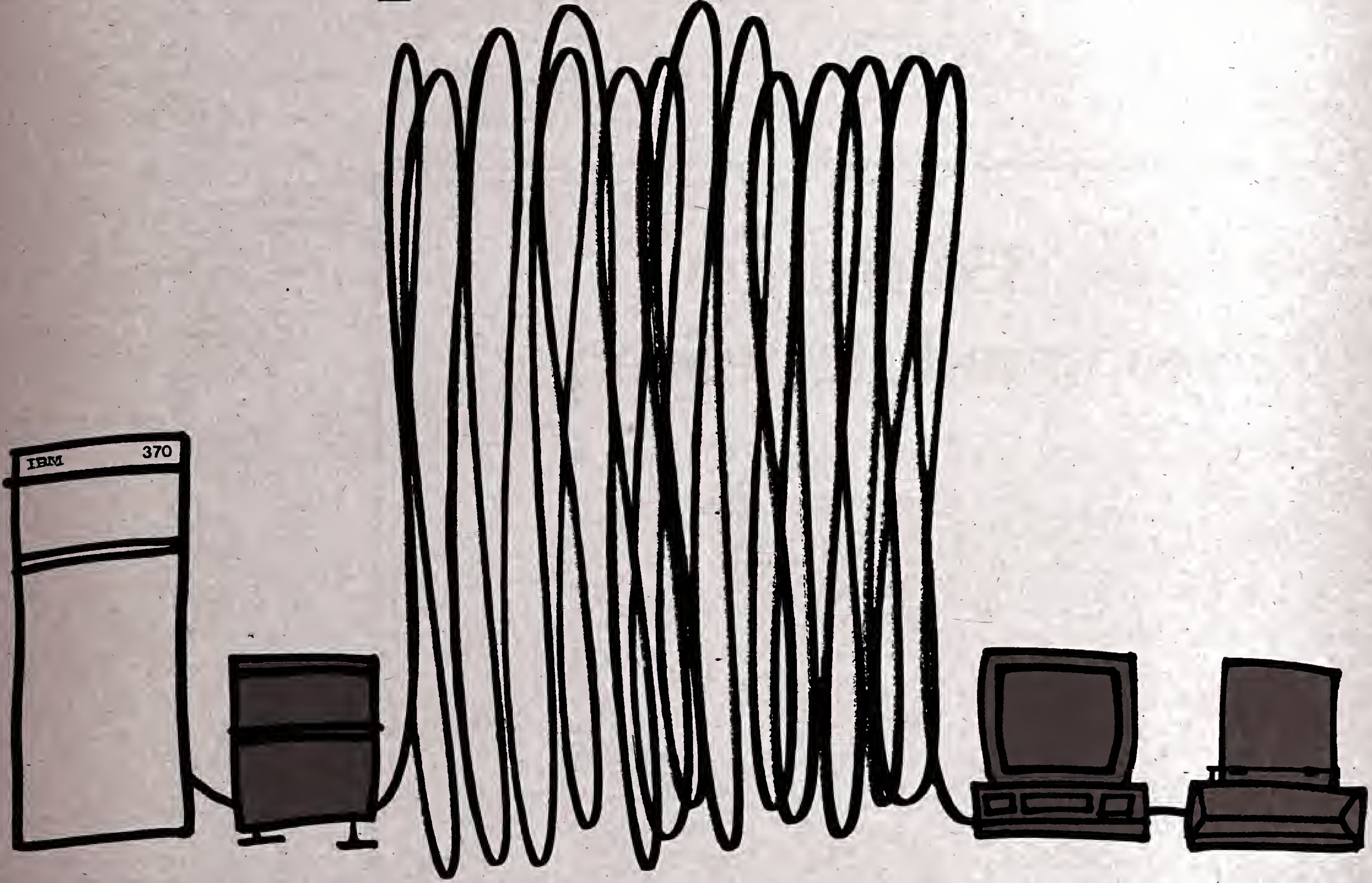

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## *On-Line on a Budget*

# One Controller Does Job of Two for County

By John D. Ketcham
Special to CW

The DuPage County (Ill.) Data Processing Department, which I direct, faced a quandary two years ago when our IBM 3272 controller reached an obvious saturation point. I solved the problem in an economical way by turning to an independently manufactured controller.

Initially, we were involved only with local, on-line development of programs; our operations had grown so much, however, that not only did we have additional, local applications to add to our network, but several county agencies were requesting new remote sites as well.

Everyone wanted to go on-line. As an IBM user, I was faced with an expensive situation: buying both an additional local controller and a fairly expensive front-end controller.

At least, that's what I thought I had to do — until I learned about the ITT Courier Systems, Inc. Virtual Terminal Line Controller (VTLC).

### Two in One

We needed to expand, both locally and remotely, in the least expensive way possible. When the Courier sales representative told me this single piece of equipment could do both local and remote processing, my first reaction was, "Why spend money on two pieces of equipment when I can do the job with one?" But my first question was, "How much?"

I had expected the cost of the Courier unit to equal the cost of two IBM controllers, plus probably a bit more for the convenience and novelty of one machine. But when the Courier rep told me the price — roughly one-third the cost of a front end plus additional controller — the decision to put it up suddenly became very easy.

Today, I have two VTLCs and 60 Courier Model 2700 terminals — 14 local and 46 remote. I've already exhausted my equipment and I'm planning to expand.

The county sheriff's department, the state's attorney and nine township assessors offices are remote users of the county IBM 370/148, running under DOS/VS. The DP department itself, the supervisor of assessments, the Education Services Region, the public works department, the Assessment Maps and Plats Office and the Comprehensive Employment and Training Act (Ceta) are all local users. We have over 2.5G bytes in on-line storage, and we process close to 30,000 transactions each eight-hour day.

### No Special Software

After we made the decision to go VTLC, our next question was, "How well does it work?" While some remote controllers require emulation or special software to make them run,t he VTLC does not require that current applications be changed or special software added.

After plugging in the VTLC, a simple Sysgen is performed to tell the control unit which devices are remote terminals and which are local. Each terminal is given an address and, through virtual processing by the VTLC, all the addresses appear as local addresses to the CPU. Going from one remote to another or from a remote to a local is simply a matter of calling up a new address.

There are a few other less dramatic advantages the VTLC has over the front-end processor. If a data center is tight on floor space, as we are, one machine is certainly less bulky than two. Moreover, they can be stacked.

The Courier unit has some interesting built-in diagnostics that can accurately track and analyze what's going on in our system. We can track what data goes from the CPU to each local and remote terminal, track what each terminal actually receives and, in turn, track the data going from each terminal back to the CPU. If we have a problem, we can always tell if it is with the CPU, the controller or the terminal.

These diagnostics, provided by the VTLC, can be displayed on the port zero terminal like a datascope, in hex, to monitor the entire channel. The screen is continually updated with high-intensity lines showing the most recent activity. This is important when a problem is an address problem rather than a hardware problem, and we need to look at the entire network.

The advantage to this is that any service we need is quite prompt, usually within hours, because Courier field engineers don't need to requisition and carry diagnostic equipment with them — it's all right here in place. In two years, the longest I've ever had to wait for service was half a day.

I have found that the Courier terminals, like the VTLC, are a very good buy. Each costs roughly $35 less than competitive units.

With 60 terminals installed and more on the way, that kind of savings mounts up quickly.

### CRT Features

We also like what Courier refers to as "refresh rate" and "buffering" because, unlike most other CRT terminals, when we backtab to a previous field, the CRT does not blink, blank out momentarily or pulsate. There is

(Continued on Page SR/22)

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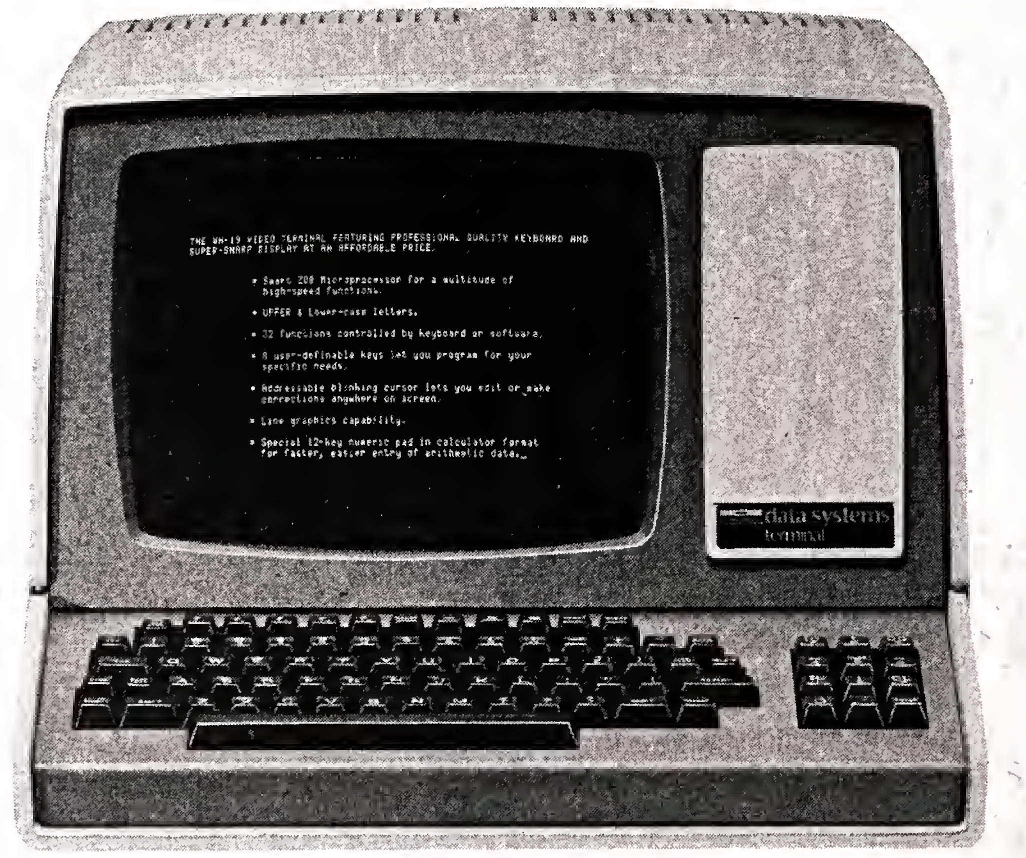

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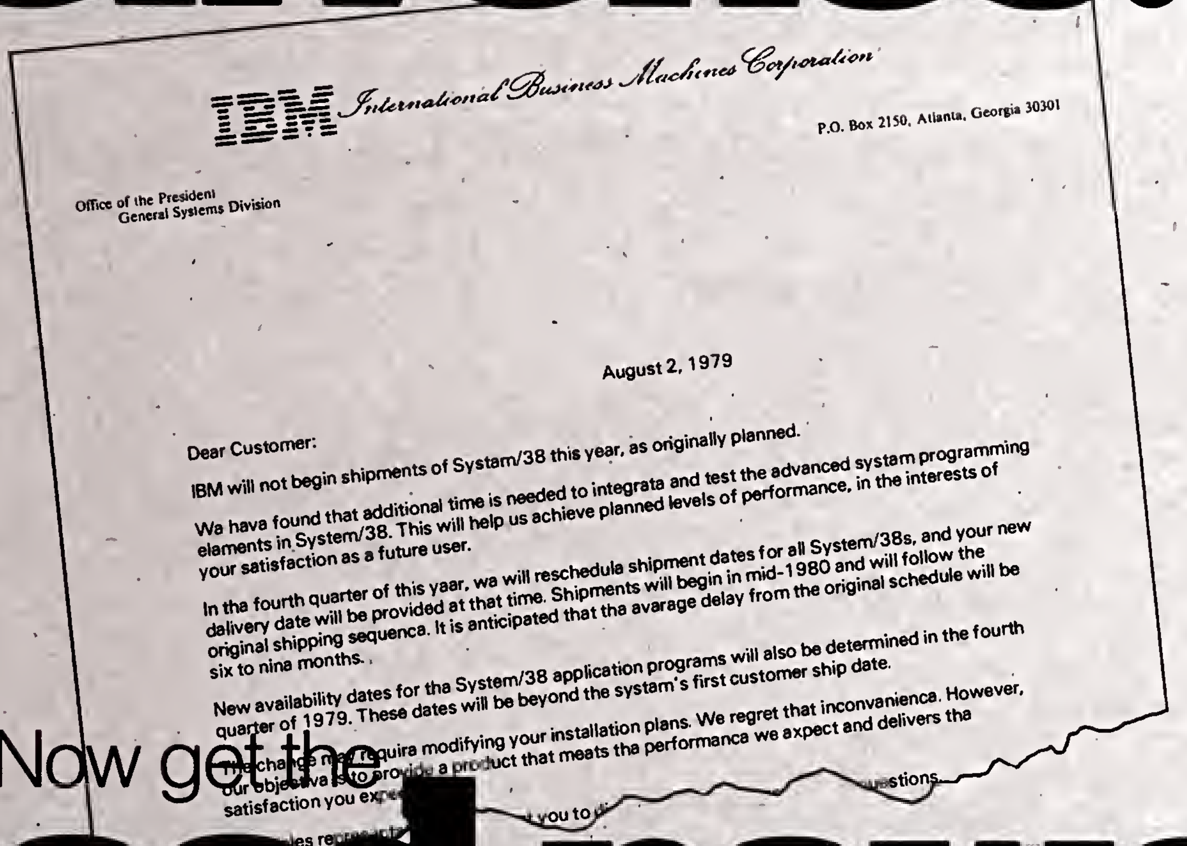

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P.O. Box 2150, Atlanta, Georgia 30301

Office of the President
General Systems Division

August 2, 1979

Dear Customer:

IBM will not begin shipments of System/38 this year, as originally planned.

We have found that additional time is needed to integrate and test the advanced system programming elements in System/38. This will help us achieve planned levels of performance, in the interests of your satisfaction as a future user.

In the fourth quarter of this year, we will reschedule shipment dates for all System/38s, and your new delivery date will be provided at that time. Shipments will begin in mid-1980 and will follow the original shipping sequence. It is anticipated that the average delay from the original schedule will be six to nine months.

New availability dates for the System/38 application programs will also be determined in the fourth quarter of 1979. These dates will be beyond the system's first customer ship date.

The change may require modifying your installation plans. We regret that inconvenience. However, our objective is to provide a product that meets the performance we expect and delivers the satisfaction you exp

you to d

questions.

les representa

Now get the

# good news from Wang.

## The bad news.

Take a good look at that letter. IBM told thousands of would-be System 38 owners that they were just going to have to wait until next year...at the earliest. That leaves thousands of businesses with outmoded, overcrowded systems. But IBM says these people are just going to have to make do until a System 38 becomes available.

## The good news.

Wang's VS virtual storage computer is available *NOW.* Not a year from now. So you can start solving today's problems today. And with Wang's field-proven RPG II conversion programs you won't sacrifice the programs you've spent years perfecting.

The VS accepts your present RPG programs like a System 3. Along with COBOL and BASIC. Yet it delivers the interactivity, ease-of-use and programmer productivity no other system can match...including the System 38.

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Perhaps the best news of all, you can buy a Wang VS today for less than a System 38 will cost you next year.

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## *Also Offers Responsibility Centralization*

# Third-Party Maintenance Can Cost 20% Less

**By Stephen Keane**
Special to CW

One of the ways computer users can stretch their DP dollars is by considering independent, third-party maintenance. There are two benefits to third-party maintenance, cost savings and centralization of maintenance responsibility.

Costs average 8% to 20% less than comparable service from a major systems manufacturer, and centralization provides both financial and operational benefits. These reasons, plus the ability to ensure system uptime by dealing with a single source, account for the growing movement toward third-party maintenance.

This movement is occurring despite the fact that such service is a relative newcomer to the DP industry. The third-party maintenance industry expects revenues of approximately $300 million in 1979, up from $215 million only two years ago.

As with any service, the best way to contract for third-party maintenance is to carefully evaluate both your needs and the capabilities of the prospective maintenance vendors. Here are some guidelines for accomplishing that.

### Annual Fees

Fees are a function of the complexity, maintainability, failure ratio and type of system to be serviced, as well as the extent of responsibility the vendor assumes. In most instances, an independent service vendor will thoroughly inspect each end-user system — much like a doctor's physical exam — and arrive at an annual service fee, usually payable in monthly installments.

The user should work closely with the maintenance firm to determine the scope of services to be provided. For example, what equipment is to be covered and for how long during the day? Should the serviceman be on call eight hours a day? Twelve? Sixteen?

Maybe 24-hour coverage is necessary, although it carries a premium rate.

The service firm should be knowledgeable, too, about the client's work routine. Preventive maintenance can then be scheduled without interfering with processing deadlines.

### Other Factors

The user should consider the proximity of service and support locations to the installation, the service firm's average time to respond to service calls, the extent of spare parts on-hand at service locations, the range of services provided and the types of test and diagnostic equipment available.

Training vendor personnel is also important. As increasingly more sophisticated equipment is introduced, maintaining it becomes more demanding.

A prospective client should examine the training programs of each maintenance firm: Is training an ongoing process? Is it a high-priority activity with sufficient funding invested in modern training tools, such as closed-circuit TV and video playback units? Does the firm keep pace with manufacturer changes and modifications?

The financial sophistication of users has led to the recognition that computers are merely business tools — assets — that should be considered like any other assets. The maintenance of these assets can be treated by someone other than the original vendor.

*Keane is president of Sorbus, Inc., a third-party maintenance firm.*

# One Controller Does Job of Two

*(Continued from Page SR/20)*

no anxiety or waiting for the screen to come back up.

The unit brings up record after record very smoothly; data seems almost to roll by. In fact, sometimes it's all so smooth we have to watch the control light on the side panel to make certain we have a new record.

The terminal can log errors and take a remote line in or out of service right from the keyboard. This same keyboard also makes it easy to select either a blinking cursor or a nonblinking cursor along with the option of underlining.

### Boon for Residents

For us, the evolution into remote processing has been a boon for the people of DuPage County. Now a resident can go to his assessor's office and instantly get information about his tax bill, the legal description of his property or the record of his tax payments.

Police and emergency personnel have dramatically cut their response time to incoming 911 emergency calls because they use our on-line street index to find the quickest route to any location in the county. The sheriff and state's attorney have a complete "people" file and on-line profile search capability. With this system, a law enforcement official can scan this file looking for possible offenders with specific characteristics.

Even without our Courier equipment, we would have gotten involved with on-line remote processing. However, we feel it would have been slower to arrive and far more expensive.

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332 Cons [illegible]

# Insurer Saves $900,000 by Using Microfiche

*(Continued from Page SR/18)*

Furthermore, the firm's computers generated information daily and this information, of course, had to be filed daily. The result was that some files were voluminous and had to be leafed through a page at a time to find information.

Two possible solutions were generated by Ohnemus' work: an on-line, centralized, inhouse system or a microfiche-based system.

The on-line system would have met all the criteria established by the firm, but it had some whopping drawbacks — in particular, the cost and delay involved in converting to on-line.

At the time, the company had an IBM 370/138 that would have been unable to handle an on-line system. A larger computer and additional terminals, programming and trained personnel would have been required — all of which would have increased labor costs.

Preliminary talks with a hardware vendor showed that it would have taken about $1 million — and one year — to complete the conversion to on-line. This was enough to justify taking a second look at a microfiche-based system.

Working with a local COM service bureau, Zytron Corp., Ohnemus designed a microfiche information-handling system. The particularly nice part, in Ohnemus' view, was that it involved no new computer equipment, no additional personnel and minimal investment for new COM readers.

Moreover, it could meet all of the firm's information handling needs.

### Cost Breakdown

The cost analysis, done in 1974, showed initial expenses to be $78,886, which would, of course, be amortized over a period of time. Figure 1 shows a detailed breakdown of this figure (See Page SR/18).

In addition, yearly expenses for maintaining the system (Figure 2) totaled approximately $65,144, or $5,428 monthly. When these figures are compared with the estimated $1 million start-up cost for the on-line system, it is easy to see why that system rapidly lost favor.

The actual installation of the COM system was not exceptionally difficult for the firm, since a good deal of the required data was already stored on the firm's computer. However, the policyholder's initial application and any correspondence are still kept in paper files, at the advice of the firm's legal department, in order to have the customer's signature in hard copy.

At present, the fiche system is used only for auto policies, with the heaviest use by the policy service, underwriting and claims adjustment departments. There are about 90 manual fiche viewers distributed in these departments and others, and each operator has his own viewer and drawer of fiche that forms his "personal data base." (The monthly rental of the same number of on-line terminals would have been $9,000.)

Operators can answer about 90% of the inquiries they get with the fiche at hand. This translates into immediate response with accurate, up-to-date information — and a cost savings.

A summary of total estimated annual savings with the system is shown in Figure 3.

About 17 to 20 new fiche are generated daily. These reflect only changes in information.

The key to the whole system is the index fiche, located in front of each fiche drawer. This provides the location for each policy by policy number. The index has one line of pertinent information for each policy, and sometimes inquiries can be answered simply from the data on the index.

This index, which is totally re-created each day, is usually about 26 cards in length.

The company has found several big advantages to using fiche. Response time to inquiries has been sharply reduced, while currency and accuracy of response has been improved.

Labor costs have been reduced, an additional 50 expensive feet of storage space have been saved and the firm can deposit customer remittances the day they are received.

*Aframe is a market research analyst with International Data Corp. of Waltham, Mass.*

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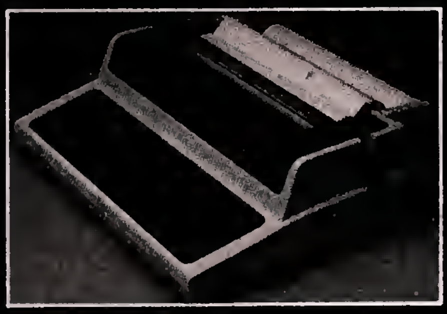

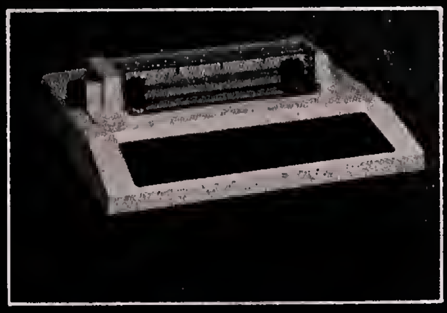

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## *Business Office Saves $700/Mo*

# Microfilm Cures Hospital's Output Ailments

By Stephen L. Priest
And Robert L. Sheehan
Special to CW

BROCKTON, Mass. — We managed to stretch our DP budget by turning to microfilm as an output medium. The switch to microfilm saved us $700/mo on one application alone.

The Brockton Hospital is a 322-bed, private, nonprofit general hospital. Our initial approach to using microfilm for the work of several departments — the business department, cancer registry, general accounting and others — was cautious, as the hospital administration was not convinced of cost and man-hour savings.

The administration's understanding was that microfilm would decrease lookup time for data, but would require expensive equipment and limit the usage of reports.

Initially, we selected microfiche for the business office's accounts receivable trial balances. Multiple hard copies of six types of trial balances had been prepared weekly and semiweekly. The voluminous costs of paper, distribution time and computer hours required to prepare and decollate these trial balances averaged $997/mo, not including the cost of storing selected trial balances for future reference.

We did a cost analysis of the way the trial balances were prepared prior to the switch to microfilm. We compared the cost for doing it the old way with the cost of having a service bureau prepare microfiche for us, and we concluded that the service bureau would be the best way to go.

### Savings in Three Areas

Our study indicated that we would save money in three areas: elimination of paper, reduction of computer report preparation time (since magnetic tape is faster to output) and reduction of clerical distribution time (man-hours). Also, the amount of space necessary for storing hard copy would be reduced, and the reports would be available more rapidly than with hard copy.

Since we could not cost-justify inhouse processing because of our expected low volume, we decided to use a service bureau.

The cost of producing the microfiche, including the purchase of 10 viewers amortized over 36 months, averaged $300/mo. Thus, the hospital realized an average savings of $700/mo.

After we put the receivables trial balances on microfiche, we began looking at the collection department. This department had been preparing a hardcopy bad-debts trial balance on the computer. This report contained all accounts turned over to two collection agencies.

The bad-debts report was getting larger and larger, and the hospital administration had determined that collection accounts would only be dropped upon full payment. We were consuming more and more computer time each week with no leveling off in sight.

Transferring this report to microfiche initially reduced the weekly print time by one hour. Also, the decollating and bursting of the report were eliminated, which reduced the time from printing to delivery by one full working day.

A side benefit was that both the business office and the DP clerks were pleased that their clothes and hands were no longer soiled by handling paper and carbons.

The hospital also keeps an accounts payable trial balance for paid and outstanding invoices; its size gets to be very cumbersome and continually increases computer print time. This application, too, was transferred to microfiche.

Now, six years of paid and outstanding invoices are readily available to the accounts payable clerk. Not having to decollate the report has speeded delivery and saved clerical man-hours. Storage problems, too, have been eliminated.

Hospital policy is to keep on file all items that have been posted monthly to the general ledger. This file, currently with more than six years worth of detailed information, was getting very cumbersome to handle and required more printer time each month.

By transferring the general ledger master file to microfiche, we have realized savings in computer time, paper costs and clerical handling. Storage problems have disappeared.

### Cancer Registry Reports

The successes we met in the financial areas led us to consider microfiche for the regional cancer registry. This arm of the hospital supports more than 20 regional hospitals with numerous reports. The problem was that hardcopy printing could not handle the high volume of reports necessary for 20 hospitals.

Initially, we moved two reports to microfiche. Once the hospital registrar saw the significant reduction in paper and the ease of handling microfiche, we decided to add other reports.

Another advantage was the greater ease of using available reports. Because hard copy was cumbersome and time-consuming to use, it often discouraged people from using a report altogether. This negated the positive aspects of a

*(Continued on Page SR/25)*

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Dr. Alec Grimison,
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# Micros in DP: The Growing Need For Quality and Standards

By Alex d’Agapeyeff

The arrival of the more powerful microprocessors, configured into general-purpose systems, has had a divisive impact on computing.

This is particularly true where the separation between the two cultures, the old and the new, has been increased by outbreaks of active hostility. DP departments sometimes behave as if they are protecting their flock from a dangerous indulgence which is marketed by hucksters making outlandish claims based on moonlighters' equipment and software. The micro fraternity acts as the enlightened ones liberating the world from the defensive bastions of remote, overly complex and overly expensive forms of computing.

The needs of the end user are the battleground. The enlightened salesperson offers an attractive, display-oriented box which is very cheap, looks convenient and is said to have complete software support. There is a friendly conspiracy to call the box whatever might be helpful to bypass any restrictive buying rules.

Compatibility and program maintenance are seldom mentioned. Customers are to be kept happy and are treated as if they existed in a static environment, all on their own.

The DP staff, when it hears of this type of offering, is tempted to treat it as an infringement of its monopoly. The staff tends to respond with threats, or forecasts of doom, rather than positive alternatives. Staffers may also be unaware of what these boxes can do.

### Harmful Situation

It is a silly situation, contrary to the long-term interest of the end user and, therefore, ultimately detrimental to both camps. The so-called "personal computer" is one of the most dramatic achievements in programmable microelectronics. It and its larger cousins are rapidly becoming extraordinarily powerful and, surprisingly enough, a superb platform for ergonomic software.

However, for the majority of organizations, this is a supplementary form of computing, rather than a replacement. Except in the smallest company, the end user is not alone but at a hub of links to other people. Moreover, business needs are rarely static. Compatibility of media and communications do, therefore, matter.

It may also be unpalatable, or unmentioned, but the behavior of a sizable program cannot be wholly predictable so that maintenance and extension will be an ongoing requirement, even on the smallest box.

The semiconductor industry is accustomed to startling the marketplace and to rolling over any opposition by volume pricing of extremely sophisticated hardware. Nevertheless, it is improbable that micros in DP can, or will, fulfill their promise without the active participation of existing professionals. Their skills are essential to get the applications onto the boxes. There is nothing trivial about getting local accounting routines, distributed data bases or even automated filing properly arranged as a stand-alone function in an executive office that has no professional operator or programmer.

There is also the matter of standards. The number of differently configured, desktop computers is now measured in hundreds. How many distinct terminal command dialogues, diskette conventions and versions of Basic or Cobol can be tolerated in one organization? The hostility of the DP departments is not without cause.

Everyone knows that micros are getting into all sorts of products, but their rate of change and the implications of their volume production are not widely appreciated. The personal computer has become upgradable into an inquiry station, a word processor, a key-to-disk system, a ledger machine or, given the software, all of these things. Some are very roughly comparable in performance to an IBM 1440. Many can be connected to a network via a pair of wires or a telephone line.

In general, they are more indicative of the end user's machine of the future than the average on-line terminal presently installed.

Several of the latest boxes can be configured into a multiterminal system sharing access to a fixed disk of between 8M and 80M bytes. The entire installation may cost less than $25,000 and have a capacity formerly associated with a fair-sized minicomputer. A common feature is a simple mechanism for switching between pages of random-access memory (RAM) which is cheap enough to encourage redundancy, so that time slicing can be provided through a less complex operating system.

### Coming Attractions

Next year, boxes with the new, beefed-up, 16-bit microprocessors like the Motorola 68000 will be on the market. They will also have additional processors scattered across the system. There will be special arithmetic processors for fast — the equal of mainframe — number crunching.

*For all their power and numbers, micros remain a supplementary form of computing in most companies, the author says. Micros may never fulfill their promise unless quality software and computing standards are developed, converting them from an impulse buy to a long-term investment for the end user.*

Channel processors will provide a data base front ending for larger disk stores. Processors in the printer will provide variable character sets, format and edit capabilities plus, just possibly, the means to arrange dynamic spooling. This may sound too good to be true; but it should be appreciated that the cost of even a powerful microprocessor is sinking towards that of a single 16K-bit RAM circuit.

Naturally, there may be a delay before this multiprocessor capability is readily exploitable through the right software. Nevertheless, the mass production nature of this market together with local "intelligence" is causing a radical change in peripherals, most notably in CRTs.

Volume is such a spur that there is a prospect of better units, not just cheaper versions, being available with micros than with mainframes. For example, there is a proposal in France that all TV sets, from January 1980, should have a standard external socket linked to the beam guns. The result will be to make the sets available as computing terminals with color. Simultaneously, there is a rush toward a solid-state equivalent of these terminals.

Color CRTs are likely to be compulsory in offices. But there is more to come. The circuit count in the set, and therefore the cost, can be reduced by having an onboard microprocessor. It is tempting then to enlarge that "intelligence."

Already in Britain, Viewdata Corp., which connects TV sets to central data bases or libraries of information via the telephone network, is reinvigorating the TV industry. Prototypes exist of TV sets with general-purpose microprocessors configured into small business systems.

A test bench consisting of a Viewdata TV set connected to a Digital Equipment Corp. PDP-11/03 has shown what is possible in this new kind of computing. The end user interacts directly with both local and central files of data through commands to an individually chosen retrieval package loaded from the central library to run on the local system. The data is presented in the form of textual pages, static pictures and moving schematics.

Color and graphics are both visually attractive and speed comprehension. The black-and-white CRTs are made to seem pedestrian and old-fashioned.

*(Continued on In Depth/2)*

# IN DEPTH

## Some Quality Criteria

1) **FITNESS**, or suitability, for a well-described task and user.
2) **SUPPORT**, or cost-effective and available help, before and after sale for the actual user.
3) **INTELLIGIBILITY**, or understandability, of function and operation for a carefully specified class of user.
4) **PORTABILITY**, or machine invariance, of function across different machine architectures.
5) **RELIABILITY**, or degree of functional consistency, despite the hazards of practical operation.
6) **USABILITY**, or convenience, for a designated class of user.
7) **EXTENDABILITY**, or tailorability, of functions and for new peripherals.
8) **COMPLETENESS**, or extent that it is self-contained, to meet the real needs arising from No. 1.

*(Continued from In Depth/1)*

These programmable color CRTs are, of course, attachable to mainframe networks. Yet is is more probable that they will arrive first with the micro boxes. Few of the mainframe suppliers are developing these displays themselves. Their present network protocols did not envisage that class of terminal and their telecommunications software discourages tailoring.

It also turns out that the applications are changed and their specification becomes more akin to scene-writing for a play. This is not inappropriate. The micro has brought computing right into the end user's workplace and, to make it fit there, the software must stage the data and the user's interaction with the processing. The exciting thing is the extent to which the new hardware is suitable and economical for this purpose.

Ergonomic, or friendly, computing for the general public is only just beginning. Voice synthesizer chips will bring the option of talking software in different languages and dialects (such as French or accounting jargon). Voice-activated systems will follow later and free the user from pecking at a keyboard.

Eventually, the average office desk may have the power of an IBM 370/168 with better I/O and more extensive communications so that computing will actually become the wheel of the brain. At least that is what could be possible.

It is exciting to find a Basic implementation on sale in a Byte Shop for $15. This is indicative of the pressures exerted by a mass market on cheapness and availability. The result is often good value for the enthusiast, but it can be a trap for a business executive.

Quality in software is seldom cheap, if only because of the support costs. A sample list of criteria is shown in the box. At first glance, these do not appear different from those on mainframes, but notice the emphasis on the user. Micros are bringing about a whole spectrum of end users, from the lay person to the computing specialist, and many of the criteria are relative to usage need.

It is customary to be very theoretical about qualitative considerations. For example, an aspect rarely mentioned in the literature, but of crucial practical importance, is that of "forgiveness." A user who is busy doing something else, like dealing with people, will make the most unbelieveable mistakes on a keyboard. A forgiving system is one in which, 99 times of a 100, recovery to the "ready" state is simple.

Such systems invite the further exploration of their functions and enhance the user's confidence. For the builder, this may be a matter of reliability, through relaxed program binding, but for the customer it is an implication of fitness.

### Software Support

Professional, ongoing support has not been a feature of software on micros. Worse, it is a requirement that is not understood either in crude sales terms or intellectually. Since we do not have it and can sell without it, the argument goes, why bother? The fact that repeat orders in multiples, from medium to large companies, will be dependent on effective support is only slowly being appreciated.

Again, there is a lot of nonsense discussed about "hardwarizing the programming" by those who are unaware that software logic is much more complex than that built into hardware. Putting a full operating system into read-only memory (ROM) would be a straitjacket disguised as a solution. Formal proofs of correctness in programming have little better prospect because of the dependencies on an intangible context in DP.

The plain truth is that, for decades if not always, there will be a degree of imprecision and, therefore, error in business procedures arising from the richness of purpose. Support will continue to be a necessity of quality.

Fortunately, it will become cheaper. On-site visits can be reduced or replaced by employing network facilities, like Viewdata, both to diagnose hardware/software faults and to repair the software through updates. Given sufficient redundancy, some hardware faults can also be effectively repaired this way.

In the past, software was written largely for professionals and intelligibility was rare. The problem exists at two levels, namely, overall concept and detailed operations.

The former can be seen by contrasting the Codasyl reports on data bases with the strategy of Viewdata adopted by the British Post Office. Codasyl reflects the cleverness of design ideas in a language barely understood by the inner priesthood. The Post Office describes a file as an arbitrary number of pages each of which contains an index or data. It is a description that is comprehensible to any literate person.

Initially, it seemed that so simple a system must be less capable than that of Codasyl, but if Viewdata is also employed to hold and transmit suitable retrieval programs, the functional gap is at least narrowed while comprehension is retained.

### Operational Intelligibility

Operational intelligibility aims to make the machine the slave under the direct control of the end user. The first requirement is for meaningful communication. Menu facilities have helped, but there is still a common problem with the dialogue and error reports of the operating system.

A nice option is for the applications package to be able to trap this interface so that an accounts receivable machine always talks in those terms without sudden interjections like "Qus6?" Many end users are even less likely to read a manual for an office machine than they are for their car. A manual-less system is very space redundant, but more can be done in this direction with the new fixed-disk configurations.

Most of the other criteria are reasonably obvious and largely unchanged except for portability. The need for this will be considered momentarily, but here it will be defined. Unfortunately, it has been a topic of so much double-talk that it utterly confuses DP practitioners.

The layman has a better concept of portability. It means a program will produce identical results, whether or not the code or data is correct, on different machines. All the experts are agreed that portability is inherently relative, but so much for experts. Application programs can be, and have been made, invariant as to their outputs, with the same arithmetic and the

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Portable software is not processor-efficient, but it is no worse than the average Basic. On the other hand, it is so productive for users that it is a wonder anyone tolerates anything else.

### Standards Situation

The record on standards in DP is not good, most of importance being set *de facto* by IBM, but in the micro world it is little short of disastrous. Some progress has been made on bus designs. However, processors from the same manufacturer said to be "source-compatible" may be merely similar. "IBM-compatible" diskettes are not necessarily readable on different computers and, of course, IBM employs a distinct character set, while many claims in regard to Ansi-compatible Cobol are a downright lie.

Thus, there is an increasingly attractive array of desktop and desk-sized computers all different in virtually every usage particular. If they continue to be sold in small lots to the separate offices of multiple-office companies, not only will they miss their potential, but sales will be eventually limited by the load on program maintenance. It is entirely conceivable that a rebellion among burned users will make a replacement market for IBM.

### Another Alternative

There is another alternative: New vendors are very adaptable to consistent market pressures, if only the DP community would influence buying of multiple lots in the true interests of their end users. Being in the trade, my company has about 20 different types of machine in place. This will become typical of many businesses. The end users' needs are then largely obvious even if the average user will only be able to articulate them after a year or two of experience.

The first-time end user is most concerned with immediate changes in method and in the application. In consequence, he tends to be suggestible about the actual computing. The second-time end user has more definite computing needs, feeling that a ubiquitous device should be commonly utilizable.

Once a user is accustomed to a pattern of terminal dialogue, he regards any change as undesirable whether between different applications, different terminals or different machines. Files are either personal possessions (like diskettes) or remote (like fixed disks). Both should be transportable to another computer and retain the same characteristics.

Programs, especially if tailored, are expensive and should only need professional alteration for a significant change in usage terms and, preferably, not because of some variation in the configuration.

This may sound like a plug for a big computer company as a sole-source vendor. Indeed, that is a fall-back solution but undesirable because no vendor today has a complete range of processors, peripherals, communications and software.

There is little point in waiting for the industry or some official body to set standards in this fast-moving field. Hence, if a business wants to retain a buying choice, maintain flexibility in integrated system design and meet its end user needs, it must set its own standards. The larger the business and the more those standards are copied by others, the greater the influence on potential vendors.

It is wise to begin with a certain caution. In setting a standard, a sound precept is to keep things simple, to innovate as little as possible and to anticipate the means of its abandonment.

Data communications is a good place

*(Continued on In Depth/6)*

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(Continued from In Depth/3)

to start. If there are going to be a lot of diskettes about, then consider the available choice in character sets, file structures and directory layouts plus IBM compatibility.

Line protocols can be more difficult. One set will probably be already in operation. If it is unsuitable for a desktop machine or color CRTs, then it must either be extended or another introduced in parallel. The second option may be the right choice because of the simplicity of Viewdata protocols, Teletype-compatible messages or even the packet-switching schemes now available.

### Languages, Operating Systems

Programming languages and operating systems are a more difficult subject. Standardizing on the former alone, without regard to the latter, although a step forward will not create portability.

There is already some choice. Ambitious claims are made for some Cobol and Basic implementations with CP/M. Pascal, originating from the San Diego campus of the University of California, is very nearly portable and MicroCobol from CAP-CPP, Inc. is absolutely machine invariant in application function. If these are not regarded as satisfactory, a large company might consider buying or building a portable implementation, while others may have to move in that direction more gradually.

Standards are also required in applications, at least for custom-built programs. These should include a framework of user dialogues comprising "help-me" facilities, sharable files, common utilities and complaint reports, right through to the means of program modification. These programs share few of the design features of those on mainframes. Stopping to ask the user a question is friendly and can be economical, but there should be a familiar pattern about loading, file initiation, aborting and termination.

Sooner or later, the majority of DP departments will be distributing, updating and maintaining programs to both stand-alone and connected machines. Without standards, this service will either be a mess or dreadfully labor-consuming.

The computing industry has enjoyed the belief that theirs was a volatile form of high technology. In retrospect, it is seen to have been nothing of the kind. Instead a fairly steady evolution has occurred in long-lived products (like the IBM 360), programming aids (like Cobol) and techniques (like flowcharts). Hence, no doubt, the relative paucity in DP departments of budgets for future developments, retraining of skilled staff or anything that smacks of research.

Success has been associated with the proven, the practical and an avoidance of all pioneering. It is an environment that magnifies, rather than prepares for, the shock of micros.

The problem of the micro is the breadth of its impact. It is not merely an advance in one direction. On the contrary, a discontinuity is occurring in processors, peripherals and system software plus application design, programming and scope. In addition, many old assumptions have been stood on their head.

Hardware should no longer be a dominant item, bought first, with its usage optimized by a concurrent complex of dedicated code and the user in-

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terfaces fit in as found expedient. Yet that is how it is still treated. The job of software should be to optimize the users' requirements and convenience with equipment bought piecemeal as necessary to simplify that programming.

The past has led to a fetish over formal planning. Give the average DP department the task of computerizing a number of retail outlets and it will declare that nothing can be done until it has completed a detailed study. Eventually a mammoth report will be produced, which no one else will ever read, that is heavy on mainframe-cum-communications and light on examples of actual usage.

The idea of building up applications empirically in a pilot implementation through a cycle of sample demonstration, user test, extended demo, further test and so on will be thought very foreign. There is a custom of pretending that the user should know what he will want, without unexpected change, and if he does that the implementers can estimate the cost closely and design the required capability exactly.

Established habits die hard. If DP departments can get themselves retained on micros, reequipped to handle new fields of application and acquire real experience from actual developments, there should be a flowering of their corporate role.

Few companies have any other department with a familiarity in programming. This is the basis of their opportunity. They can and should be the advisers to management on micro exploitation, the joint initiators of experiments with operational departments, the guardians of compatibility, the setters of standards, the central programming service and the performers of only those computer operations which are best left at the center. In effect, they can distribute all the elements that comprise an end-user system and its subsequent support.

### Recurrence of Opportunity

Some may feel such aims are overly ambitious, especially where a department has been slow in getting involved with micros. However, a nice thing about this field is the recurrence of opportunity. About every three years there is a restart with a fresh generation of microprocessors dissolving past limitations. Moreover, the need for corporate standards and compatibility will increase, not disappear.

On the other hand, delay does multiply the amount that has to be relearned in hardware, software and the approach to applications.

The necessary knowledge of micro hardware is not confined to a token purchase of a personal computer to play at biorhythms. Most departments will need their own engineers, the ability to configure their own test benches and experience with prototyping systems. The primary vehicle for DP applications will, of course, be file-handling systems.

The analysts and programmers will need training projects in order to exorcise their mainframe conditioning and to gain an orientation to end user attitudes. For this purpose, a training project is one in which the delivery date is sufficiently relaxed so that the implementation can have a scheduled reworking prior to cutover. The point is this: Everyone makes a mess of his first micro or small mini application after years on mainframes, and the best way to learn is to face and repair one's own errors, preferably in private.

### Extra Load

Micros are an enormous extra load on a department still busy on mainframe commitments. But they and their consequences will not go away. Management may have to be persuaded to approve the recruitment of additional analysts and programmers. It may be very difficult to spare good project staff and, certainly, micros are no place to dump Old Joe who has been a headache for years.

Nevertheless, until the DP department becomes active and wins the confidence of its potential internal customers, it will not influence the buying of systems and the choice of applications. Without that influence, the quality and standards in micros for DP will be reduced until, or unless, some other unit becomes competent and performs the same role.

The micro market has largely been made not by the established computer suppliers but by a new set of entrepre-

(Continued on In Depth/10)

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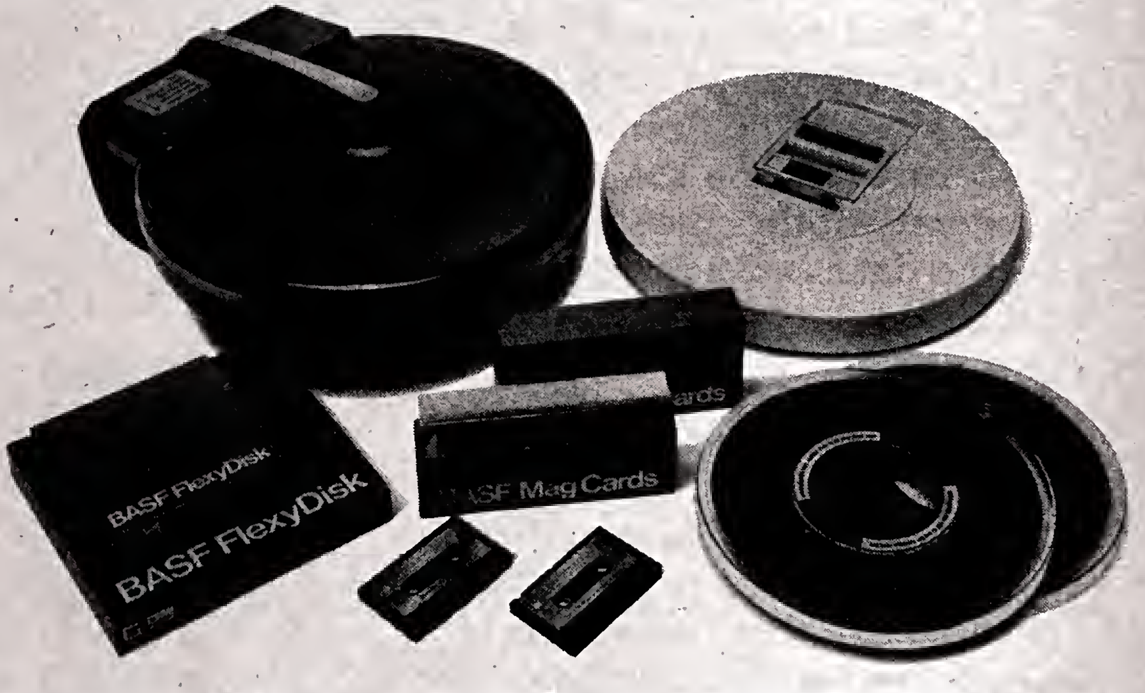

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*(Continued from In Depth/7)*

neurs. These vendors have not always been expert in DP. Their goal has been volume through low prices which encourages the cutting of corners. They have shown what is possible, but they are open to criticism.

Unfortunately, commentators have not always separated their judgment of the vendors from their judgment of micros. In regard to the latter, the qualification is seldom made as to present developments. One often hears the phrase "micros cannot . . ." without any reference as to future capabilities.

The cost effectiveness of microprocessors is removing the curse of processor efficiency and, thereby, making possible friendly, flexible and portable software. According to a survey in Britain, nearly 80% of executives would like to interface directly with a computer.

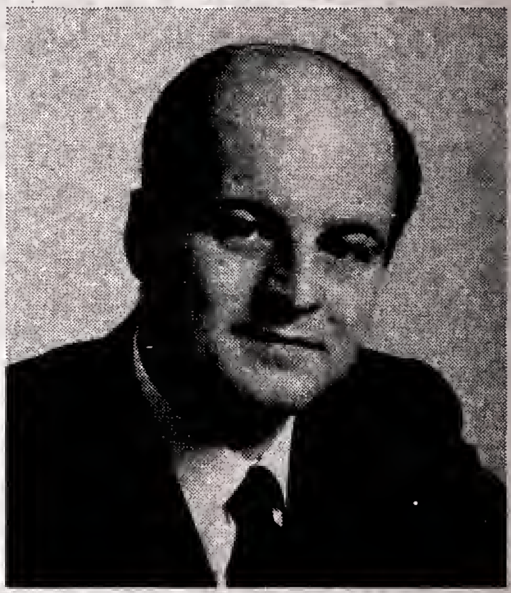
It is a safe bet that most would prefer a command-driven color CRT with its own micro capable of stand-alone operation rather than a mainframe terminal entirely controlled and programmed by someone else. Better, of course, would be a judicious mixture of local and remote processing plus an amalgam of professionally written software and D-I-Y commands.

The executive will not anticipate the need for compatibility, portability and reliability. He will simply assume their existence. And why not? It is the job of the service units to deal with these petty necessities of their operational brethren. Quality and standards are no big deal in themselves. It is only our relative lack of competence which makes them seem so hard to attain.

At the same time, the DP fraternity should not allow the widely voiced dismay over software, especially by engineers, to reduce their confidence in further progress. There is a fable that hardware advances have long been ahead of our means of usage. In DP this is pure moonshine. Costly mainframes with their hideously complex operations have imposed centralization, the mixing of applications and the tailoring of user systems to fit the hardware.

Micros reduce those impositions. Already, better debugged code is being produced faster and with less maintenance difficulties than on the best of mainframes. Thus far the applications are rather simple but they are of the type that users often prefer.

If more processing were done, where appropriate, on application-dedicated machines, DP departments would find that their efforts were much more productive. They would then be in a position to concentrate on their customers' true requirements instead of on contriving a compromise solution on unsuitable equipment. Micros are part of that change.



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*D'Agapeyeff founded the group of software companies in 1962 with three colleagues. Among the group subsidiaries is a company responsible for developing and marketing CAP-CPP's microcomputer software.*

*D'Agapeyeff is a former president of the British Computer Society, and a member of the Science Research Council Computing Science Committee and the Computing Systems and Electronics Requirements Board. He has also performed advisory roles for the British government.*

*A well-known speaker in Europe, d'Agapeyeff has also traveled widely in the U.S. during CAP-CPP's assessment of the microprocessor industry.*

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## *Programmer's Handbook*

# Batch-Proof Error Analysis

### By Robert B. Higgins

Many common program-design tasks have found good, fairly general solutions at one site or another, yet those solutions have rarely been distributed to a wider audience in a collected, usable form.

This communications gap has many bad effects:

- Useful and economical features are not included in new systems because the designers aren't aware of them.
- Known features are omitted from new systems because the cost or risk of recreating them appears excessive.
- Analysts and programmers spend far too much time and money reinventing solutions to common tasks rather than concentrating on the unique requirements of the current application project — and sometimes the new "wheels" come out square.
- Even the good solutions don't receive enough careful study and may fail unexpectedly when copied into a new context.
- Systems users, and the general public, face a bewildering variety of limitations and failure modes in everyday DP functions.

As a first step toward seeking good solutions to common programming tasks, verifying and documenting them, then presenting them to a wider audience, Programmer's Handbook looks at batch-proof error analysis.

### Describing the Task

Transactions that must pass through several processing stages are often grouped into batches with proof totals to control their handling and guard against errors. Proof totals are most often used with money-related items (charges, payments and so forth). They may also be quite justifiable on batches of sensitive nonmonetary items, representing the total number of hours worked in a time-card batch, for example, or even the hash total of check numbers on a batch of stop-payment orders. In some cases, such as with checks batched for bank deposit, proof totals are required by the receiving group.

Strictly speaking, batch/proof totals mean redundant, extra work. If every transmission and transcription were 100% reliable, proofing would be quite unnecessary. But no real-world process is 100% accurate, so batch-totaling has evolved (over several centuries) as one means to greater reliability — at the cost of extra labor.

The procedure is simply a way to "package" data to reduce the risk of undetected loss or damage. Hardware parity-checking is one example of the proof-total concept; check digits on account numbers are another.

Manual procedures can't afford to extract much information from a proof-total discrepancy. The well-known "divisible by 9" acid test for transposition errors is the only feasible manual check before buckling down to item-by-item review of the unbalanced batch. But when a computer is involved, some further arithmetic tests become worthwhile because they can highlight those few items within the batch that are the most likely to contain an error. The final manual effort to pinpoint the error(s) is thereby made faster, less monotonous and more human.

### Tests On 'Outage'

Recent *Computerworld* articles by Irwin Kraus and this author [Oct. 9 and Nov. 6, 1978] have explored arithmetic tests on the "outage," or out-of-proof amount — the re-added total minus the input total — that can tentatively pinpoint a numeric transcription error. Here is a summary of these tests:

- If a digit is inserted (153 becomes 1553), dividing 9 into the significant digits of the (positive) outage yields the inserted digit as remainder and the left-shifted digits as quotient (unless the inserted digit is a 9).
- If digits are transposed (4639 becomes 4936), the outage divides exactly by 9 and the quotient of this division contains much information about the transposed digits and their column positions.
- If a digit is miscopied (2938 becomes 2988), the outage contains exactly one nonzero digit, in the miscopied column.
- If a digit is dropped (2783 becomes 283) — dividing 9 into the significant digits of the (negative) outage yields the lost digit as remainder and the right-shifted digits as quotient (unless the lost digit is a 9).
- If a transaction is duplicated, the (positive) outage exactly equals that transaction's control value.
- In the opinion of Robert M. Green, a bank-systems consultant who has closely studied high-volume operations and their failure modes, the most frequent numeric transcription errors are inserted zeroes, adjacent transposition, nonadjacent transposition and miscopied digits.

### Design Strategy

The arithmetic tests discussed above require only a few data items to operate on, which are described below as "interface specs." Because of this functional simplicity, we can implement the tests as a generalized facility which can be included unchanged in any program that needs it. The one unavoidable requirement on the outer program is that it must supply the re-added batch total to the facility *before* presenting the detailed transactions for testing: this implies some kind of intermediate stacking of an entire batch.

This proof-error-analysis facility is implemented with two interface paragraphs, PROOF-TOTAL-ANALYZE and PROOF-ITEM-ANALYZE. For each batch of items, the outer program should PERFORM-PROOF-TOTAL-ANALYZE once when both the input total and the re-added total are available, then (if necessary) proceed to PERFORM-PROOF-ITEM-ANALYZE once for each transaction in the batch. In "structured English," with parentheses enclosing optional shortcut code:

```
FOR each batch
  Supply both proof totals
  PERFORM PROOF-TOTAL-ANALYZE
  FOR each transaction in this batch
    (IF batch is out-of-proof)
      Supply control-field value
      PERFORM PROOF-ITEM-ANALYZE
      Process results
    (ENDIF)
  ENDFOR each transaction
ENDFOR each batch
```

*(Continued on In Depth/12)*

## *Input Request*

Got a better idea?

Readers are urged to share Cobol-oriented commercial DP programming tasks, inventions and discoveries with the author in the interest of distributing good solutions to common problems to a wider DP audience.

The author is prepared to respond to any trends that appear in readers' suggestions and to report on them, carefully acknowledging the source of such suggestions in any published material. Readers can assist by giving exact credit (where possible ) for any item submitted.

Comments, materials, requests and suggestions should be sent to Robert B. Higgins, P.O. Box 572, West Chester, Pa. 19380.

# IN DEPTH

*(Continued from In Depth/11)*

Note that this functional flow will mesh well with two different design strategies for the outer program: one that processes each batch from original input through an intermediate stack to final output before opening the next batch or one that copies all batches from the original input to a work file (capturing the proof totals for each batch and storing them in the process) and then PERFORMs the interface paragraphs while copying the batches from the work file to the final output files.

### Interface Specs

Each interface paragraph requires some input values and returns some output values and conditions. Here are the detailed specs:

PROOF-TOTAL-ANALYZE: detects any proof-total outage and tests it for the patterns which typify each kind of transcription error.

Inputs: PROOF-INPUT-TOTAL must be filled with the external proof total supplied with this batch;
PROOF-CALC-TOTAL must be filled with the re-added total.

Outputs: PROOF-OUTAGE will contain 'CALC minus INPUT';
PROOF-OKAY is true if the batch is in balance;
PROOF-SUBST-POSSIBLE is true if the outage could be the result of a single miscopied digit;
PROOF-TRANSP-POSSIBLE is true if the outage could be the result of just transcription error(s).

Notes: PROOF-ITEM-ANALYZE refers to the outputs of PROOF-TOTAL-ANALYZE, so the outer program must not change their values;
SUBST-POSSIBLE and TRANSP-POSSIBLE are *undefined* if PROOF-OKAY is true.

— — —

PROOF-ITEM-ANALYZE: tests one item's proof-field value against PROOF-TOTAL-ANALYZE's inferences and reports any pattern matches.

Inputs: PROOF-ITEM-FIELD-VALUE must be filled with this item's proof-field value.

Outputs: PROOF-ITEM-FIX-VALUE receives the "corrected" value of the field, if any inferred pattern is matched;
PROOF-NO-POSS (True = no pattern matches),
PROOF-POSS-DUPE (True = duplicate item?),
PROOF-POSS-MISSING (True = lost item?),
PROOF-POSS-SUBST (True = miscopied digit?),
PROOF-POSS-INSERT (True = inserted digit?),
PROOF-POSS-LOST (True = lost digit?),
PROOF-POSS-TRANSP (True = single-digit transposition?),
PROOF-POSS-PERMUTE (True = multi-digit transposition?).

All of these data names are defined in the Data Division code, along with the internal data items (Figures 1 and 2).

The code looks for a *single* transaction value which could completely explain the outage if it is mistranscribed in some common fashion. If more than one transcription error has actually occurred in a batch, this facility will produce useless or misleading output. Data control personnel must understand that the "corrections" are *tentative*, and they should be rewarded for reporting any bad outputs. If multiple-error batches are uncomfortably frequent, it may be wise to reduce the batch size.

The code assumes that the proof-controlled fields are unsigned. This greatly simplifies the routine and sharpens the accuracy of its outputs. A good system-design idea in general is to avoid signed fields in transactions, because of their greater vulnerability to error or fraud.

At best, the "sign" of a numeric field should be implied by the transaction type. Next best is to separate debits from credits into different batches. At the very least, debits and credits in the same batch should be controlled by separate proof totals.

The design of this facility can be very easily extended to handle batches that are proofed on several control totals. In any case, the "unsigned" assumption is not an undesirable limitation.

Items which fail edit-checks on other fields should still be added to the internal proof total to avoid spurious out-of-balance errors. In fact, with this routine installed, items with edit failures even in the proof field should also be passed in, because the routine may well recover the correct value of the field. Nonnumeric characters in the proof field should be scrubbed in some consistent manner before adding and proofing the item.

Users seeking greater efficiency may choose to add USAGE COMP to those data items in the code which are not redefined as digit strings. Warning: Some compilers pretend that *all* COMP fields are signed, regardless of the PICTURE, which will shatter this logic. The ASSERT in PROOF-X-ANALYZE-OUTAGE (See Figure 3 at end of article) is included to intercept this danger.

### Subjective Diagnosis

The routine's diagnosis of "miscopied digit" errors is somewhat subjective: it considers visually confusable pairs of digits (1 vs. 7, for example) and assimilation to adjacent digits (69626 becomes 69226). The design hazard in this area is that a too-aggressive search for systematic causes of miscopying could produce code that would flag every item in an "outage explainable as miscopied digit" batch.

*(Continued on In Depth/14)*

```
***** DATA AREAS FOR PROOF-ERROR-ANALYSIS ROUTINE *****
*     (FROM "THE PROGRAMMER'S HANDBOOK" COMPUTERWORLD 1979)
*
*      NAMING CONVENTIONS:
* PROOF-XXX  FIELDS/PARA'S VISIBLE TO OUTSIDE USER;
* PROOFC-XXX CONSTANTS WITHIN THE ROUTINES;
* PROOF-X-XXX FIELDS/PARA'S USED ONLY BY 'PROOF-TOTAL-ANALYZE'
* PROOF-Z-XXX FIELDS/PARA'S USED ONLY BY 'PROOF-ITEM-ANALYZE'
* PROOF-Y-XXX FIELDS LOADED BY 'PROOF-TOTAL-ANALYZE',
*              USED BY 'PROOF-ITEM-ANALYZE'
*
 01  PROOF-DATA-AREAS.
     05  PROOFC-FIELD-WIDTH      PIC 99    VALUE 12.
     05  PROOF-DATA-BY-FIELD.
*****                            PIC 9(12-N)V9(N)
         10  PROOF-INPUT-TOTAL   PIC 9(10)V99.
         10  PROOF-CALC-TOTAL    PIC 9(10)V99.
         10  PROOF-OUTAGE        PIC S9(10)V99.
             88  PROOF-OKAY                VALUE ZERO.
         10  PROOF-Y-OUTAGE      REDEFINES PROOF-OUTAGE PIC S9(12).
         10  PROOF-ITEM-FIELD-VALUE PIC 9(10)V99.
         10  PROOF-Z-ITEM-VALUE  REDEFINES PROOF-ITEM-FIELD-VALUE
                                 PIC 9(12).
         10  PROOF-ITEM-FIX-VALUE  PIC 9(10)V99.
         10  PROOF-Z-ITEM-POSS-FIX REDEFINES PROOF-ITEM-FIX-VALUE
                                 PIC 9(12).
         10  PROOF-Z-ITEM-ERROR-POSS PIC X.
             88  PROOF-NO-POSS             VALUE SPACE.
             88  PROOF-POSS-DUPE           VALUE "D".
             88  PROOF-POSS-MISSING        VALUE "M".
             88  PROOF-POSS-INSERT         VALUE "I".
             88  PROOF-POSS-LOST           VALUE "L".
             88  PROOF-POSS-TRANSP         VALUE "T".
             88  PROOF-POSS-PERMUTE        VALUE "P".
             88  PROOF-POSS-SUBST          VALUE "S".
         10  PROOF-Y-ABS-OUTAGE   PIC 9(12).
         10  PROOF-Y-SHIFT-FACTOR PIC 9(12).
         10  PROOF-Y-SHIFTED-OUTAGE PIC S9(12).
         10  PROOF-Y-SHIFTED-ABS-OUTAGE  PIC 9(12).
             88  PROOF-SUBST-POSSIBLE      VALUES 1 THRU 9.
         10  PROOF-X-SHIFTED-ABS-DIGITS
                                 REDEFINES PROOF-Y-SHIFTED-ABS-OUTAGE.
             15  PROOF-X-SHIFTED-ABS-DIGIT
                                 PIC 9     OCCURS 12.
         10  PROOF-Y-9-QUO        PIC 9(12).
         10  PROOF-Y-9-REM        PIC 9.
             88  PROOF-TRANSP-POSSIBLE     VALUE ZERO.
         10  PROOF-Y-9-COMBO      PIC 9(12).
         10  PROOF-X-1-QUO        PIC 9(12).
             88  PROOF-Y-ONE-TRANSP-POSS   VALUES 1 THRU 9.

                                            (This COBOL code may be
                                            copied without permission)
```

Figure 1

```
     05  PROOF-X-1-REM           PIC 9(12).
     05  PROOF-X-1S              PIC 9(13).
     05  PROOF-Z-DIGIT-TESTAREA            OCCURS 2.
         15  PROOF-Z-TEST-DIGIT  PIC X     OCCURS 12
                  INDEXED BY PROOF-Z-DIGIT-TEST-INDEX,
                             PROOF-Z-DIGIT-SEARCH-INDEX.
     05  PROOF-Z-UNTRANSP-COUNT  PIC 99.
     05  PROOF-Z-TRANSP-COUNT    PIC 99.
     05  PROOF-Z-SHIFTED-VAL     PIC 9(12).
     05  PROOF-Z-SHIFTED-VAL-1DEC
                                 REDEFINES PROOF-Z-SHIFTED-VAL
                                 PIC 9(11)V9.
     05  PROOF-Z-SHIFTED-VAL-DIGITS
                                 REDEFINES PROOF-Z-SHIFTED-VAL.
         15  PROOF-Z-SHIFTED-VAL-DIGIT
                                 PIC 9     OCCURS 12.
     05  PROOFC-SUBST-TABLE-SIZE PIC 9     VALUE 9.
     05  PROOF-Z-SUBST-TABLE-LOAD    PIC X(36)
              VALUE " 358 235 538 325 617 606 808 909 123".
     05  PROOF-Z-SUBST-TABLE  REDEFINES PROOF-Z-SUBST-TABLE-LOAD.
         15  PROOF-Z-SUBST-TABLE-ENTRY     OCCURS 9
*****                  *****DEPENDING ON PROOFC-SUBST-TABLE-SIZE
                                 INDEXED BY PROOF-Z-SUBST-INDEX.
             20  FILLER               PIC X.
             20  PROOF-Z-SUBST-DIFF  PIC 9.
             20  PROOF-Z-SUBST-LOW   PIC 9.
             20  PROOF-Z-SUBST-HIGH  PIC 9.
*
*********************************************************
*
*    THIS COBOL CODE MAY BE FREELY REPRODUCED WITHOUT
*      PERMISSION, PROVIDING THAT ITS SOURCE IS
*      IDENTIFIED.
*
*  DISCLAIMER:
*
*    THE AUTHOR HAS DILIGENTLY CHECKED AND TESTED THIS CODE,
*      BUT OFFERS *NO* WARRANTY (EXPRESS OR IMPLIED) OF
*      ITS CORRECTNESS.
*
*********************************************************
```

Figure 2

# Remote computing is dead.

# Long live Offsite™ computing!

Minicomputer manufacturers hammered the first nails in the coffin. They built mega-minis bigger than lots of mainframes, and priced them at a fraction of the cost.

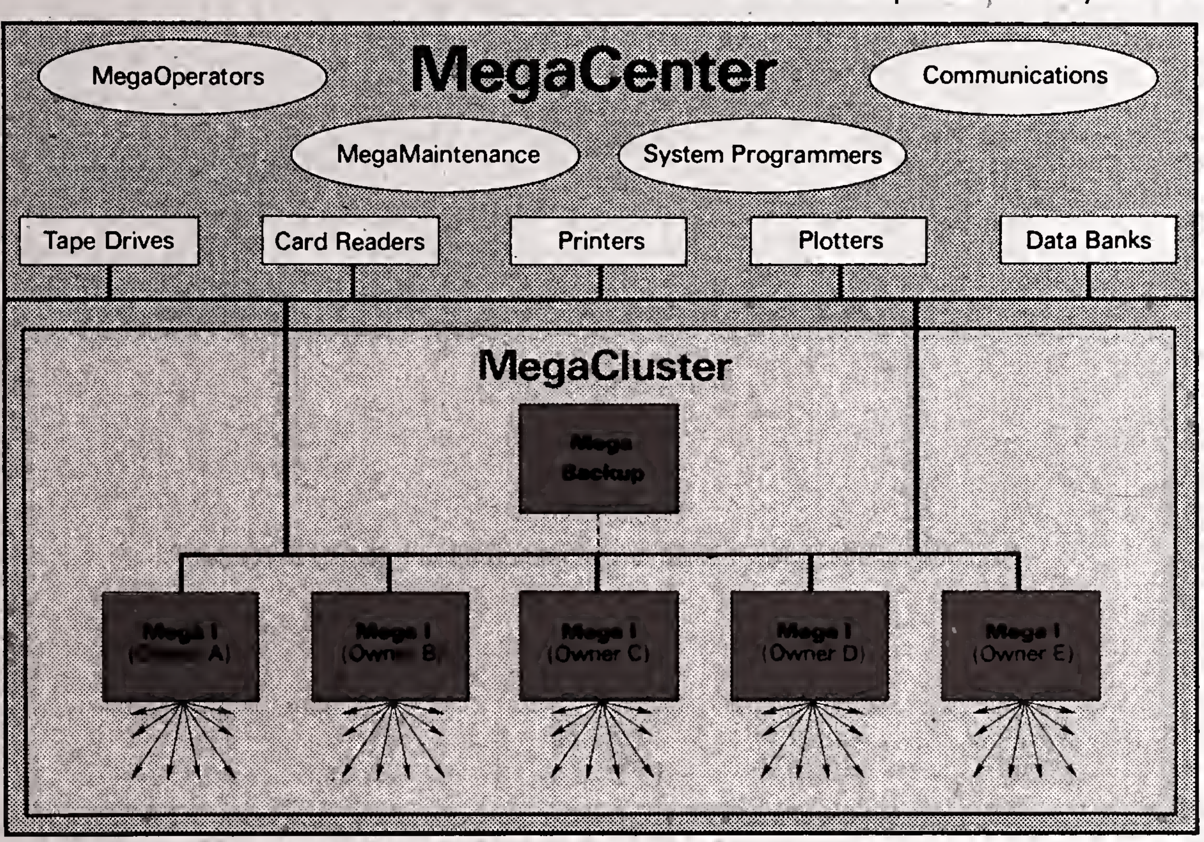
Now the IBM 4300 has driven more nails in the coffin by putting additional downward pressure on mega-mini pricing.

No wonder lots of remote computing users are tempted to buy big minis and install them in-house.

**The pallbearers.**

Despite the challenge of high-powered, low-cost minis, the most notable group trying to bury remote computing is formed by the remote computing companies themselves!

Some of the largest remote computing companies (Tymshare, NCSS, ADP and Rapidata) have started selling minicomputers to their remote computing customers.



**Running scared?**

We suggest that these companies were so shook up by the low-cost mini (as compared with the high cost of remote computing) that they rushed to cover their flanks. In doing so, they forgot where they came from. They forgot why remote computing has grown into a multibillion-dollar industry over the last ten years.

**Remote users don't want computers.**

Though there are exceptions, the largest companies are the heaviest users of remote computing services. They can buy computers like most companies buy typewriters. But many of their users won't. Why?

**The on-site problem.**

Remote computing users invariably want to avoid problems that automatically come with putting computers on-site. Hardware selection, facility development, installation, operation, maintenance, system analysis, programming, communications, security, recruiting and training are just some of the problems that accompany a decision to put a computer on-site...even if it is a mini (and don't let the mini marketers tell you otherwise!).

*In fact, the only reason for a remote user to go on-site is to get back some of the money he is putting into remote computing.*

Now, with MegaSystems, even this financial reason is wiped out.

**The Offsite™ approach.**

You buy or lease it. We keep it. That's the essence of the Offsite™ approach to remote computing.

We will sell or lease you the Mega I, a mega-mini with capability greater than an IBM 370/138. But, instead of putting it on your site, we place it in our MegaCenter.

There we provide the facility, the installation, 24-hour-a-day operators, maintenance, systems analysts and communications personnel. Everything and everyone necessary to provide you with a complete remote computing capability.

**Unlimited use, one price.**

High cost is burying remote computing. The more you use, the more you pay. No longer. Our Offsite™ approach changes all that.

Because the Mega I is *your* computer, you have unlimited use of it. You pay us just one flat monthly price covering hardware, software and maintenance.

Is that price a bargain? At conventional remote computing rates you would pay over $200,000 a month for what the Offsite™ approach gives you for just over $10,000. Yes, you read it right. A 20 to 1 price advantage.

In fact, if you are spending as little as $8-10,000 per month for remote computing (or are planning to), you should rush to evaluate our Offsite™ approach.

**Free backup.**

The single biggest problem in on-line computing is downtime. The more important the system, the higher the cost of downtime. Our Offsite™ approach virtually eliminates it.

At our MegaCenter your Mega I is installed in a MegaCluster with five other Mega I's. In each MegaCluster, we provide one more Mega I, the MegaBackup.

In event of a problem with your machine, our operators will put your system on the MegaBackup and leave it there until your machine is running again. All at no charge. Note: if you buy your own mini and put it on-site, you would have to buy a second mini (doubling your hardware costs) to provide such a backup.

**The Mega I is IBM plug-compatible.**

Your Mega I is a complete computer system, including on-line disk storage, configured to your needs. It can handle up to 32 simultaneous users. In the MegaCenter we provide you with infrequently used peripherals at a minimal use charge, so you do not have to buy them.

Install any IBM 360/370 software on your Mega I. Or if you need help in developing software for a new application, we have software packages that probably fit your needs.

**Setting up a new on-line system?**

Suppose you are not remote computing now, but want to develop an on-line system. Should you consider the Mega I and our Offsite™ solution?

There is no faster, more economical way of having a high-powered on-line system with none of the headaches and delays that go with on-site hardware. Need we say more?

**Waiting for a 4300?**

Take a short lease on a Mega I now and get your 4300 plans rolling. Switch over when IBM comes through, if you still think an on-site 4300 is worth it.

**Do you run a DP center?**

Most DP center managers do not want remote computing, except in a pinch. But unlike conventional remote computing, our Offsite™ cost structure is far more attractive. The ready availability of our Mega I with its IBM-compatibility and short term lease may be just what you need to break up a hardware log jam.

**Resurrect remote computing now.**

Our Offsite™ approach gives you, for the first time in the history of remote computing, all the computer time you need for one flat price. Yet you receive all the advantages of remote computing, including extensive software support, if you need it.

For immediate consideration of our Offsite™ approach, call Pete Fasulo at 212-895-7880. For a brochure and other information, write Pete at MegaSystems Associates, 777 Northern Blvd., Great Neck, NY 11021.

**MegaSystems**

**Creator of the Offsite™ solution.**

```
 PROOF-ERROR-ANALYZE SECTION.
 PROOF-TOTAL-ANALYZE.
     SUBTRACT PROOF-INPUT-TOTAL FROM PROOF-CALC-TOTAL
         GIVING PROOF-OUTAGE.
     IF NOT PROOF-OKAY
         PERFORM PROOF-X-ANALYZE-OUTAGE.
 PROOF-X-ANALYZE-OUTAGE.
*        CALCULATE USEFUL FUNCTIONS OF THE OUTAGE AMOUNT
     MOVE 1 TO PROOF-Y-SHIFT-FACTOR.
     MOVE PROOF-Y-OUTAGE TO PROOF-Y-ABS-OUTAGE,
                           PROOF-Y-SHIFTED-ABS-OUTAGE.
*    ASSERT PROOF-Y-OUTAGE < ZERO  AND
*          (PROOF-Y-OUTAGE + PROOF-Y-ABS-OUTAGE) = ZERO
*    OR     PROOF-Y-OUTAGE > ZERO  AND
*          (PROOF-Y-OUTAGE - PROOF-Y-ABS-OUTAGE) = ZERO
     PERFORM PROOF-X-SHIFT-OUTAGE.
     DIVIDE PROOF-Y-SHIFT-FACTOR INTO PROOF-Y-OUTAGE
         GIVING PROOF-Y-SHIFTED-OUTAGE.
     DIVIDE 9 INTO PROOF-Y-SHIFTED-ABS-OUTAGE
         GIVING PROOF-Y-9-QUO  REMAINDER PROOF-Y-9-REM.
     COMPUTE PROOF-Y-9-COMBO = 10 * PROOF-Y-9-QUO +
                               PROOF-Y-9-REM.
     IF PROOF-TRANSP-POSSIBLE
         MOVE ZERO TO PROOF-X-1S
         PERFORM PROOF-X-ANALYZE-TRANSP.
 PROOF-X-SHIFT-OUTAGE.
*    RIGHT-JUSTIFY THE SIG-FIGS OF THE OUTAGE
*
*      ASSERT PROOF-Y-ABS-OUTAGE = (PROOF-Y-SHIFTED-ABS-OUTAGE
*                                  * PROOF-Y-SHIFT-FACTOR).
     IF PROOF-X-SHIFTED-ABS-DIGIT (PROOFC-FIELD-WIDTH) = ZERO
         MULTIPLY 10 BY PROOF-Y-SHIFT-FACTOR
         DIVIDE 10 INTO PROOF-Y-SHIFTED-ABS-OUTAGE
         GO TO PROOF-X-SHIFT-OUTAGE.
 PROOF-X-ANALYZE-TRANSP.
*        DETERMINE WHETHER THE (SHIFTED) OUTAGE IS EXACTLY DIVISIBLE BY
*          SOME STRING OF 1'S -- WHICH CHARACTERIZES A SINGLE-DIGIT
*          TRANSPOSITION
     COMPUTE PROOF-X-1S = PROOF-X-1S * 10  +  1 .
     DIVIDE PROOF-X-1S INTO PROOF-Y-9-QUO
         GIVING PROOF-X-1-QUO  REMAINDER PROOF-X-1-REM.
     IF PROOF-X-1-QUO > ZERO  AND
       (PROOF-X-1-REM > ZERO OR PROOF-X-1-QUO > 9)
         GO TO PROOF-X-ANALYZE-TRANSP.
*    ASSERT PROOF-Y-1-QUO = ZERO  [UNSUCCESSFUL EXIT]
*        OR PROOF-X-1-REM = ZERO AND PROOF-X-1-QUO > 0 AND < 10
*                                  [SUCCESSFUL EXIT]

                                        (This COBOL code may be
                                        copied without permission)
```

Figure 3

```
 PROOF-ITEM-ANALYZE.
     MOVE SPACE TO PROOF-Z-ITEM-ERROR-POSS.
     IF (NOT PROOF-OKAY)  AND
        PROOF-Y-OUTAGE NOT > PROOF-Z-ITEM-VALUE
          PERFORM PROOF-Z-ITEM-ERROR-ANALYZE.
 PROOF-Z-ITEM-ERROR-ANALYZE.
*        THIS ITEM "MIGHT" HAVE CAUSED THE OUTAGE --
*          TEST FIRST FOR MISSING/DUPL ITEM
     IF PROOF-Z-ITEM-VALUE = PROOF-Y-ABS-OUTAGE
         MOVE PROOF-Z-ITEM-VALUE TO PROOF-Z-ITEM-POSS-FIX
         IF PROOF-OUTAGE > ZERO
             MOVE "D" TO PROOF-Z-ITEM-ERROR-POSS
         ELSE
             MOVE "M" TO PROOF-Z-ITEM-ERROR-POSS
     ELSE
         PERFORM PROOF-Z-ITEM-VALUE-ANALYZE.
 PROOF-Z-ITEM-VALUE-ANALYZE.
*        TEST SUCCESSIVELY FOR INSERTED/LOST DIGIT, TRANSPOSED/
*          PERMUTED DIGITS, OR MISCOPIED DIGIT
     SUBTRACT PROOF-Y-OUTAGE FROM PROOF-Z-ITEM-VALUE
         GIVING PROOF-Z-ITEM-POSS-FIX.
     DIVIDE PROOF-Y-SHIFT-FACTOR INTO PROOF-Z-ITEM-VALUE
         GIVING PROOF-Z-SHIFTED-VAL.
     IF PROOF-OUTAGE > ZERO  AND
        (PROOF-Z-SHIFTED-VAL = PROOF-Y-9-COMBO  OR
         PROOF-Y-9-REM = ZERO  AND
         PROOF-Z-SHIFTED-VAL = (PROOF-Y-9-COMBO - 1))
             MOVE "I" TO PROOF-Z-ITEM-ERROR-POSS.
     IF PROOF-NO-POSS
       IF PROOF-OUTAGE < ZERO  AND
        (PROOF-Z-SHIFTED-VAL = PROOF-Y-9-QUO  OR
         PROOF-Y-9-REM = ZERO  AND
         PROOF-Z-SHIFTED-VAL = (PROOF-Y-9-QUO - 1))
             MOVE "L" TO PROOF-Z-ITEM-ERROR-POSS.
     IF PROOF-NO-POSS
       IF PROOF-TRANSP-POSSIBLE
         MOVE PROOF-Z-ITEM-VALUE TO PROOF-Z-DIGIT-TESTAREA (1)
         MOVE PROOF-Z-ITEM-POSS-FIX TO PROOF-Z-DIGIT-TESTAREA (2)
         SET PROOF-Z-DIGIT-TEST-INDEX TO PROOFC-FIELD-WIDTH
         MOVE ZERO TO PROOF-Z-UNTRANSP-COUNT
         PERFORM PROOF-Z-TRANSP-TEST-SAME
         SET PROOF-Z-DIGIT-TEST-INDEX TO PROOFC-FIELD-WIDTH
         MOVE ZERO TO PROOF-Z-TRANSP-COUNT
         PERFORM PROOF-Z-TRANSP-TEST-MOVED
         IF (PROOF-Z-TRANSP-COUNT + PROOF-Z-UNTRANSP-COUNT) =
             PROOFC-FIELD-WIDTH
             IF PROOF-Z-UNTRANSP-COUNT = PROOFC-FIELD-WIDTH - 2
                 MOVE "T" TO PROOF-Z-ITEM-ERROR-POSS
             ELSE
                 MOVE "P" TO PROOF-Z-ITEM-ERROR-POSS.
     IF PROOF-NO-POSS
       IF PROOF-SUBST-POSSIBLE
         PERFORM PROOF-Z-SUBST-ANALYZE.
*************************************************************

                                        (This COBOL code may be
                                        copied without permission)
```

Figure 4

*(Continued from In Depth/12)*

Judith Gardner (FMC, Philadelphia) supplied several of the confusable digit pairs. She also suggested a miscopy mode which is beyond the scope of this code: picking up a digit or value from the previous item when transcribing from a list of items. Users may wish to revise or restrict these tests.

The 12-digit field width should be ample. It is fully parameterized in the procedure code and thus may be changed by modifying the numeric PICTUREs and altering the VALUE of PROOFC-FIELD-WIDTH. The externally visible fields are PICTUREd with two decimal places; the user can change this freely, provided that total length and (lack of) sign are preserved. The user may also wish to deparameterize the procedure code (replace any reference to PROOFC-FIELD-WIDTH by a literal 12 or whatever) for compactness, since this handbook is a back-up reference — providing he cites it in his program narrative!

This facility grows more effective as the precision of the control field increases. For example, payments that are quoted to the penny will get more benefit than those rounded off.

The various PROOF-POSS- diagnoses are "mutex/collex" (mutually exclusive, collectively exhaustive). In other words, *exactly one* of them will be true upon exit from the routine. Some errors could be diagnosed two ways (for example, "1226 becomes 10226" could be called either an inserted zero or a transposition with a leading zero): the code tests first for duplicate and missing transactions, then for lost and inserted digits, then for transposition and last for substitution.

We are now finished with the external description of this facility. To use it, a programmer now needs only two COPY statements, one for the data definitions (Figures 1 and 2) and one for the procedure code (Figures 3-6 at the end of this article), and that's all!

This code reflects a gentle approach to "rigorous" ANS Cobol. Some aspects of this approach are:

- GO-TOs used only to loop *within* a single paragraph.
- The simplest 'PERFORM paragraph-name,' always referring forward, as the only means used to transfer control between paragraphs (entirely excluding PERFORM-THRU/-UNTIL/VARYING, EXIT and fall-through).
- 88-level condition-names on primary fields rather than using "switch" data items.
- Parameter constants such as PROOFC-FIELD-WIDTH to eliminate most numeric literals.

*(Continued on In Depth/17)*

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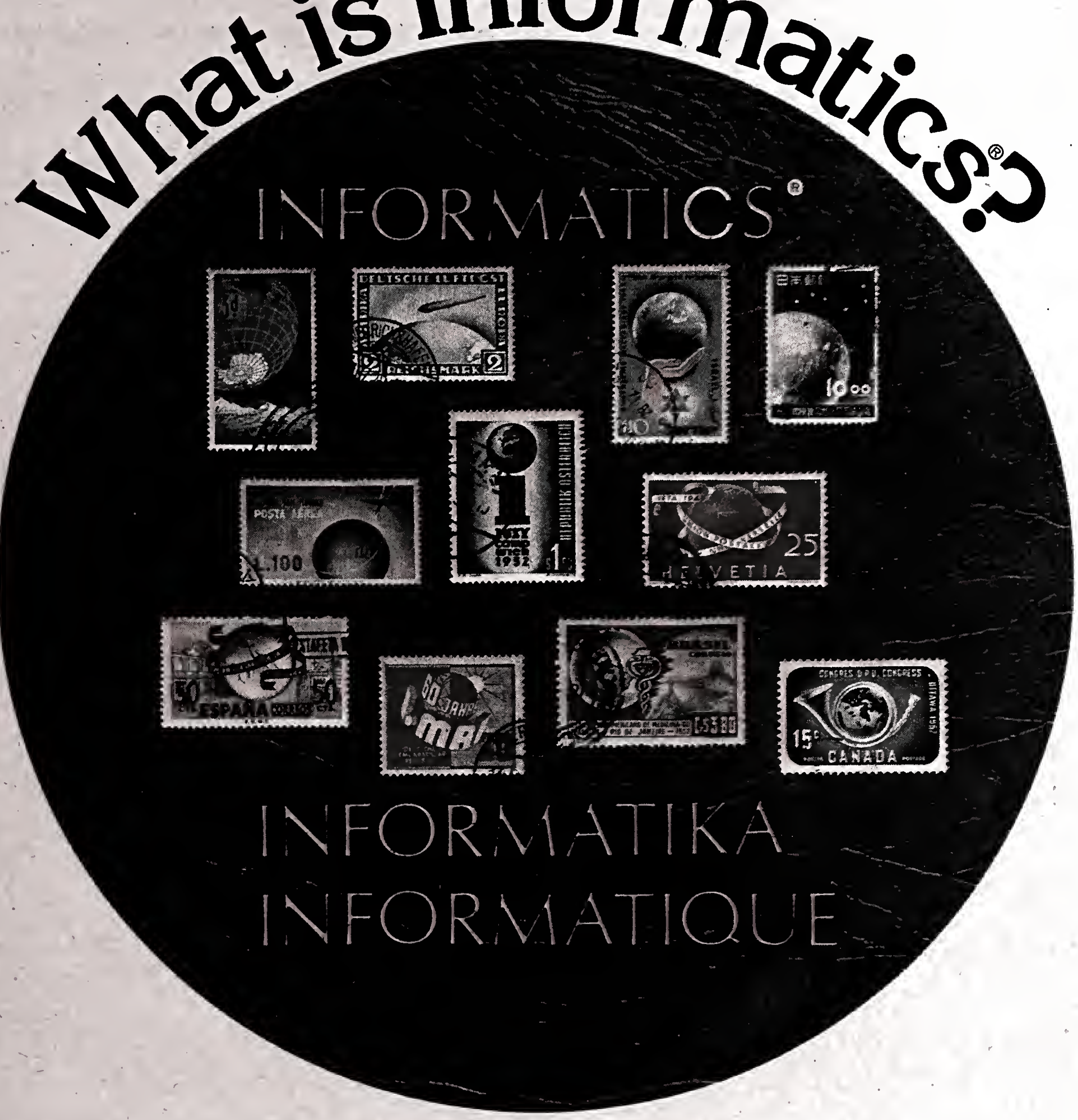

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```
 PROOF-Z-TRANSP-TEST-SAME.
*        COUNT (DESTRUCTIVELY) ALL 'SAME DIGITS IN SAME POSITIONS'
     IF PROOF-Z-TEST-DIGIT (1,PROOF-Z-DIGIT-TEST-INDEX) =
        PROOF-Z-TEST-DIGIT (2,PROOF-Z-DIGIT-TEST-INDEX)
           ADD 1 TO PROOF-Z-UNTRANSP-COUNT
           MOVE "X" TO
              PROOF-Z-TEST-DIGIT (1, PROOF-Z-DIGIT-TEST-INDEX)
              PROOF-Z-TEST-DIGIT (2, PROOF-Z-DIGIT-TEST-INDEX).
     IF PROOF-Z-DIGIT-TEST-INDEX > 1
         SET PROOF-Z-DIGIT-TEST-INDEX DOWN BY 1
         GO TO PROOF-Z-TRANSP-TEST-SAME.
 PROOF-Z-TRANSP-TEST-MOVED.
*        COUNT (DESTRUCTIVELY) 'SHIFTED' DIGITS, STOPPING WHEN
*           ALL ARE FOUND ORELSE ONE IS UNFINDABLE
     IF PROOF-Z-DIGIT-TEST-INDEX > ZERO
         IF "X" = PROOF-Z-TEST-DIGIT (1, PROOF-Z-DIGIT-TEST-INDEX)
             SET PROOF-Z-DIGIT-TEST-INDEX DOWN BY 1
             GO TO PROOF-Z-TRANSP-TEST-MOVED
         ELSE
             SET PROOF-Z-DIGIT-SEARCH-INDEX TO PROOFC-FIELD-WIDTH
             PERFORM PROOF-Z-TRANSP-TEST-SEARCH
             IF PROOF-Z-DIGIT-SEARCH-INDEX > ZERO
                 ADD 1 TO PROOF-Z-TRANSP-COUNT
                 MOVE "X" TO
                    PROOF-Z-TEST-DIGIT (1, PROOF-Z-DIGIT-TEST-INDEX)
                    PROOF-Z-TEST-DIGIT (2, PROOF-Z-DIGIT-SEARCH-INDEX)
                 SET PROOF-Z-DIGIT-TEST-INDEX DOWN BY 1
                 GO TO PROOF-Z-TRANSP-TEST-MOVED.
*    ASSERT PROOF-Z-DIGIT-TEST-INDEX = ZERO    [SUCCESSFUL EXIT]
*        OR PROOF-Z-DIGIT-SEARCH-INDEX = ZERO  [UNSUCCESSFUL EXIT]
 PROOF-Z-TRANSP-TEST-SEARCH.
*        SEARCH FOR A SHIFTED MATCHING DIGIT
     IF PROOF-Z-DIGIT-SEARCH-INDEX > ZERO  AND
         PROOF-Z-TEST-DIGIT (1, PROOF-Z-DIGIT-TEST-INDEX) NOT =
         PROOF-Z-TEST-DIGIT (2, PROOF-Z-DIGIT-SEARCH-INDEX)
             SET PROOF-Z-DIGIT-SEARCH-INDEX DOWN BY 1
             GO TO PROOF-Z-TRANSP-TEST-SEARCH.

                                        (This COBOL code may be
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```

Figure 5

```
 PROOF-Z-SUBST-ANALYZE.
*        RECOGNIZE CREDIBLE DIGIT-SUBSTITUTIONS
*           (MISREAD OR ASSIMILATED)
     DIVIDE PROOF-Y-SHIFT-FACTOR INTO PROOF-Z-ITEM-VALUE
         GIVING PROOF-Z-SHIFTED-VAL-1DEC.
     IF (PROOF-Z-SHIFTED-VAL-DIGIT (PROOFC-FIELD-WIDTH - 1)
         - PROOF-Y-SHIFTED-OUTAGE) < 10  AND NOT < 0
         IF (PROOF-Z-SHIFTED-VAL-DIGIT (PROOFC-FIELD-WIDTH - 1) =
                 PROOF-Z-SHIFTED-VAL-DIGIT (PROOFC-FIELD-WIDTH - 2)
            OR PROOF-Z-SHIFTED-VAL-DIGIT (PROOFC-FIELD-WIDTH) )
             MOVE "S" TO PROOF-Z-ITEM-ERROR-POSS
         ELSE
             SET PROOF-Z-SUBST-INDEX TO PROOFC-SUBST-TABLE-SIZE
             PERFORM PROOF-Z-SUBST-LOOKUP
             IF PROOF-Z-SUBST-INDEX > ZERO
                 MOVE "S" TO PROOF-Z-ITEM-ERROR-POSS.
 PROOF-Z-SUBST-LOOKUP.
*        LOOKUP A DIGIT-PAIR IN THE 'CONFUSABLES' TABLE
     IF PROOF-Z-SUBST-INDEX > ZERO
         IF PROOF-Y-SHIFTED-ABS-OUTAGE NOT =
             PROOF-Z-SUBST-DIFF (PROOF-Z-SUBST-INDEX)
         OR (PROOF-OUTAGE > ZERO  AND
             PROOF-Z-SHIFTED-VAL-DIGIT (PROOFC-FIELD-WIDTH - 1) NOT =
             PROOF-Z-SUBST-HIGH (PROOF-Z-SUBST-INDEX))
         OR (PROOF-OUTAGE < ZERO  AND
             PROOF-Z-SHIFTED-VAL-DIGIT (PROOFC-FIELD-WIDTH - 1) NOT =
             PROOF-Z-SUBST-LOW (PROOF-Z-SUBST-INDEX))
                 SET PROOF-Z-SUBST-INDEX DOWN BY 1
                 GO TO PROOF-Z-SUBST-LOOKUP.

                                        (This COBOL code may be
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```

Figure 6

*(Continued from In Depth/14)*

- The ASSERT pseudo-verb to make logic assumptions explicit (ASSERT X means IF NOT (X) THEN STOP "LOGIC FAILURE #nnn").
- A naming convention which specifies the scope of each data item — its range of visibility, in other words.

Several sources have influenced this style, most notably the Systemacs coding strategy of Maurice Babb and Jack Connor and the book *Elements of Programming Style* by Kernighan and Plauger.

A recently added construct in Codasyl Cobol would have been desirable in this code, but is not yet widely implemented: "SET condition-name TO TRUE." The result-setting statements like MOVE "I" TO PROOF-Z-TRAN-ERROR-POSS could then have been written as SET PROOF-POSS-INSERT TO TRUE, eliminating the alpha literal and clarifying the code.

## Acknowledgements, Offers

I wish to thank Irwin Kraus (Kansas City Blue Cross/Blue Shield) who opened the subject of proof-outage analysis in his In-Depth [CW, Oct. 9].

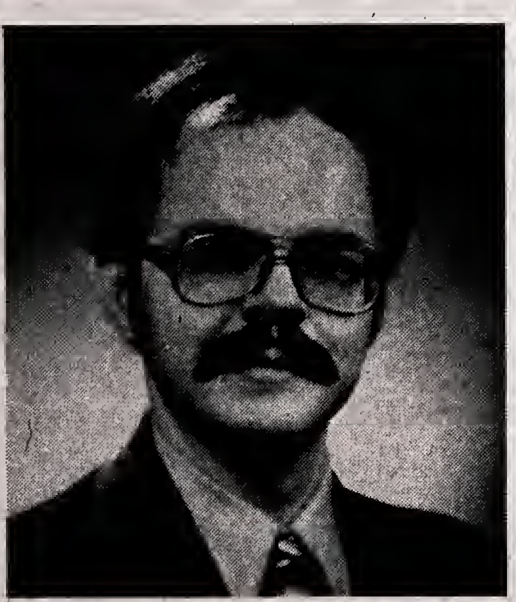
Robert M. Green (Green Associates, Madison, Conn.) gave me some informed comments from his experience.

John Corrigan (Swann Oil, Bala-Cynwyd, Pa.) and Philip Ciaverelli (PNB, Philadelphia) helped by referring me to Mr. Green.

Thanks also to JD and several West Chester friends for their encouragement and to Clarinda Bishop Abdelnour (NCR Corp., Cambridge, Ohio) for requesting a copy of this article before it was even written.

The author stands ready to provide the following supplements by direct mail, upon written request and accompanied by a self-addressed, stamped envelope:

- Extended code to handle multiple control-fields.
- The facility in CALL-module format, with a COPYable parameter block.
- An 80-column card deck of the code within an installation-testing driver program (at-cost fee still under negotiation).



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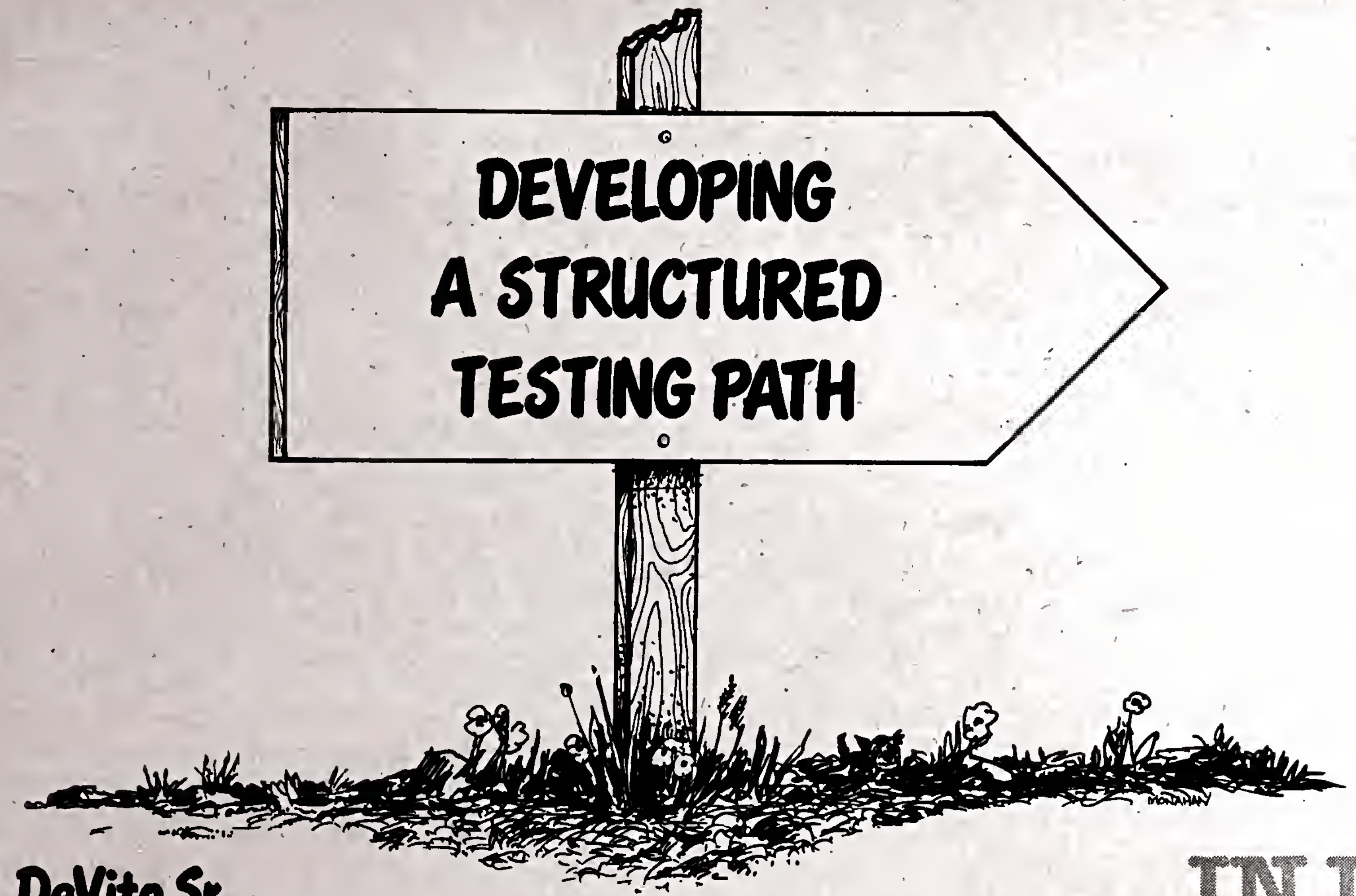

# DEVELOPING A STRUCTURED TESTING PATH

### By Edward C. DeVito Sr.

No programmer or analyst is perfect, communication between user and DPers is not always at its best and time is usually short. The result of these working conditions is mistakes, mistakes, mistakes.

The number and extent of errors that may result from a logic change to an existing system depend upon several critical factors:

1) The ability of the analyst to understand exactly what is required and to relate this requirement to the programmer.

2) The ability of the programmer to generate code that exactly reflects the specifications set forth.

3) Communications between the user and the analyst.

4) The amount of time allocated to install the modification.

I do not pretend to have the solution to these problems, but I am certain that 95% of the bugs that enter the production mode can be eliminated by using a well-defined structured testing path.

What follows, then, are the results of my last year's work to develop just that — a sound, well-structured testing path.

In the course of evolving a structured testing path, I also developed the following definitions of testing methodology:

**Unit testing:** Testing a change made to an existing program; or testing the logic of a newly created program.

**Integrated or series testing:** Testing a logic change made to one or more existing programs; or testing the logic of one or more newly developed programs, where the output of one program will affect the processing of transactions of another program which uses the preceding program's output as input.

**Systems testing:** Testing logic changes made to existing or newly developed programs as they affect the processing of transactions throughout the entire system, and relative to other systems which use this system's output as input, which may or may not be processed and returned to this system for updating or validation purposes.

**Resource testing:** Testing to ensure that with the addition of newly created or changed programs, sufficient resources are available, if needed.

**Positive testing:** Testing to ensure that the logic of newly developed program(s) or the logic changes to existing program(s) do in fact process particular transactions in a valid manner and according to the specifications set forth. Consider the following example (Figure 1).

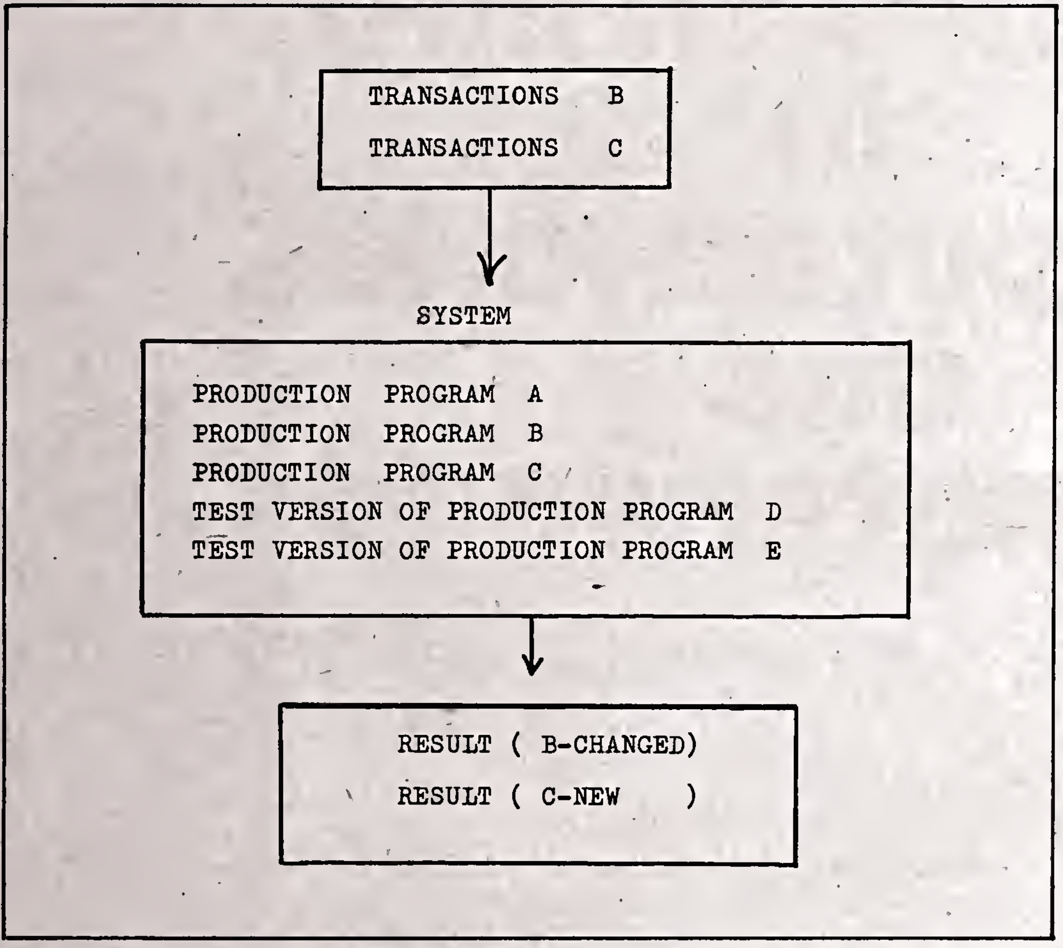

**Figure 1. Positive Testing**

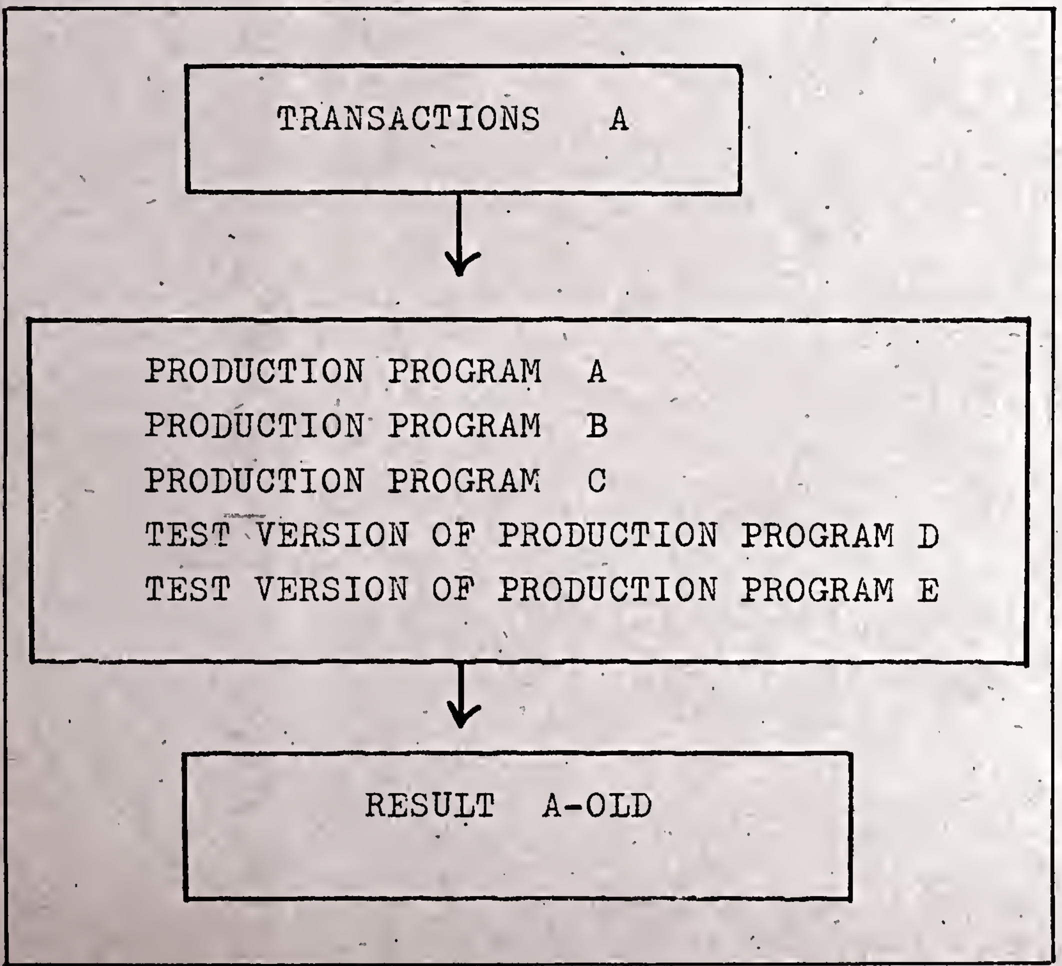

**Figure 2. Negative Testing**

Transactions A are currently processed to produce result (A-Old). Transactions B are currently processed to produce result (B-Old). A change is made to process B transactions differently to produce (B-Changed) results. A change is also made to process a new transaction called C, to produce a result (C-New).

Positive testing would be accomplished as follows: Input transactions B and C to the system, where the changed and/or newly created programs are executing, along with the unchanged current programs, and verify that the results are (B-Changed) and (C-New), for transactions B and C respectively such that (B-Changed) and (C-New) meet the user's specifications.

**Negative testing:** Testing to ensure that changes made to a system, either by the addition of newly created programs or changes to current production programs, do not adversely affect the processing of transactions not applicable to the change.

Referring to Figure 2, negative testing would verify that processing transaction A when executing the new or changed programs within the system still produces Result (A-Old) for transaction Type A since the changes made to the system should only affect the processing of transaction types B and C — not Type A.

## Setting Up the Path

The project should set up a well-defined path for testing. That is, certain steps should be followed from unit testing to the time the program(s) enter the production mode. For example:

**Step 1.** The programmer documents what type of transactions will be affected by his program and what the desired results should be. He lists the conditions to be tested and the desired results — for example, Transaction B causes update to enforce file whereas before, transaction Type B did not cause update and Transaction C is a

*(Continued on In Depth/20)*

*(Continued from In Depth/19)*

new transaction which causes a premium recalculation to Type X data.

**Step 2.** The programmer constructs input data applicable to his list of conditions, executes his program(s) and verifies and documents the results to be valid.

**Step 3.** The programmer hands this documentation to a testing team who will test the programs relative to the entire system. He will also list any other programs in the system which he knows will be affected by his processing of Type B and C transactions. Within this documentation will be a list of conditions the programmer wants to test on a systemwide basis.

**Step 4.** The testing team will submit a copy of this documentation to each project leader stating:

a) The date this modification will be tested.

b) That if this change affects any programs other than those listed, the testing team should be informed.

c) That any project leaders with comments on the change should notify the testing team by a certain date.

d) That the project leader should have the programmer available for the systems test.

**Step 5.** The testing team notifies the user of the date the system modification will be tested and requests the user's involvement.

When actual testing commences, it is imperative that there be no deviation from the structured path defined above.

Efficient testing requires development of a set of well-defined test transactions. They should encompass as many combinations of conditions as are inherent in the system. The model set should be well documented in terms of order of input and expected results. Each time the system is modified, additional transactions should be developed applicable to that enhancement and added to the model set.

For example, consider a payroll system. Transactions should be developed which generate checks, drafts, reports and so forth. If a modification is added, such as a retroactive benefit, new transactions capable of generating the retroactive benefit should be created and added to the existing model set of test transactions. Thus, the model set is continually expanding with enhancements.

Using this strategy, a well-developed model set of transactions will be created. The time used creating these transactions is well spent, since they eliminate many production problems caused by inadequate testing. Furthermore, they build good documentation.

### Storing for Reuse

For batch testing, keeping a backup of model test transactions for reuse is no problem. A file is created and backed up. However, for on-line systems interfacing with batch, a method must be developed to capture and hold the data prior to execution of any on-line modules.

For example, if we input a transaction on-line, once we hit the enter key, data is transmitted to the first executable on-line module, which either processes the data or calls other modules which do. Therefore, a function must be developed to input the model set of transactions and have these transactions written to a file for storage before any of the on-line modules start processing data. Another function must be developed to process these transactions through the on-line system, that is, read the file where the transactions have been stored and pass them to the first executable on-line module as if they were input directly by the user.

Once these functions are developed, the user can enter all the test transactions via on-line data entry. Using the special function, the transactions will be stored on a file bypassing all on-line processing. This file is then backed up.

When the user is ready, he can utilize the second special function which will retrieve the transactions from the storage file and process them through the system. He always has the backup for reinitialization.

All of this can be accomplished by either buying an IBM package or developing your own function to fit your project needs exactly.

I favor the latter method.

In order to test properly, we need to compare transactions processed by on-line and batch production programs against those same transactions processed using the programs being tested

*(Continued on In Depth/22)*

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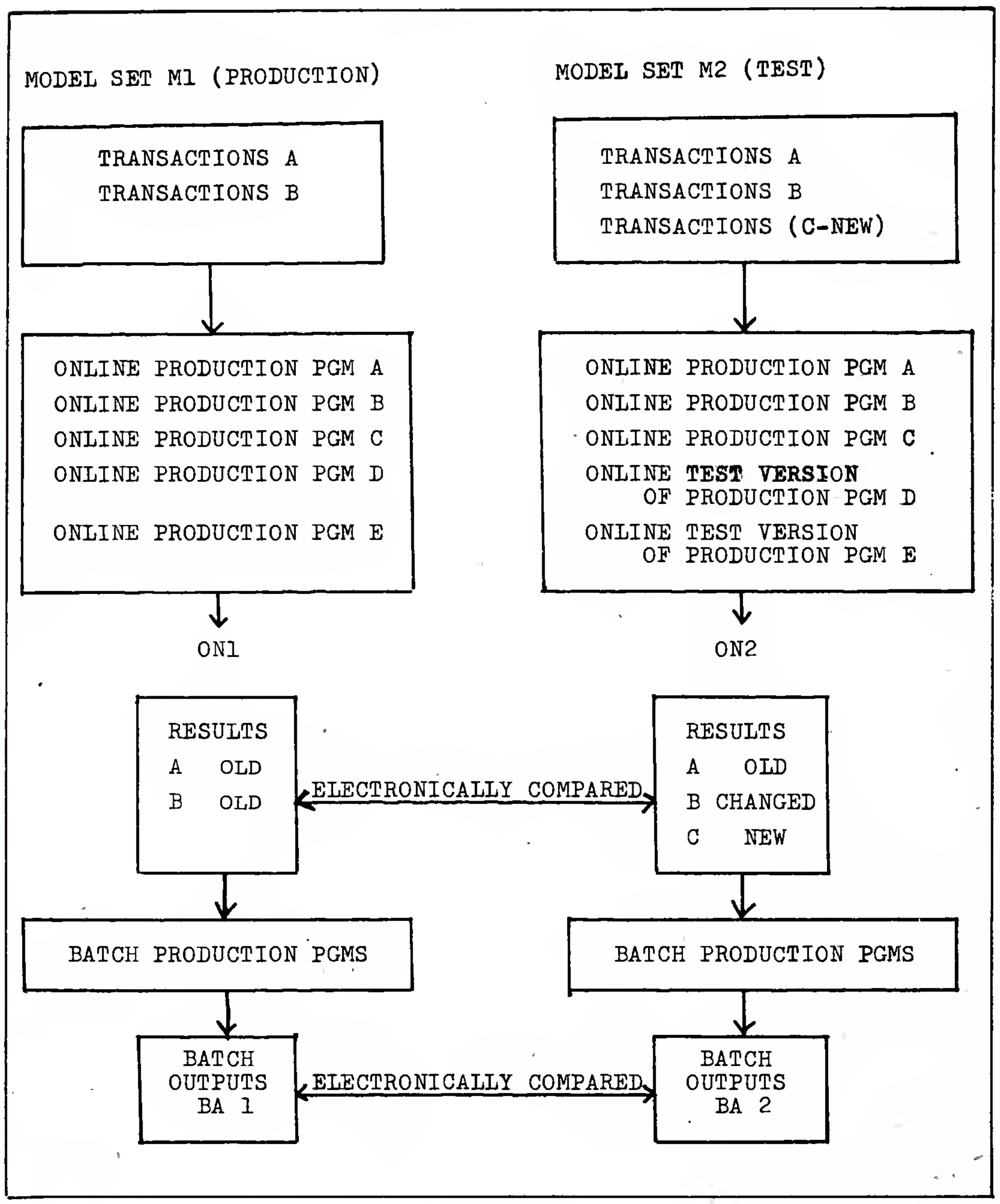

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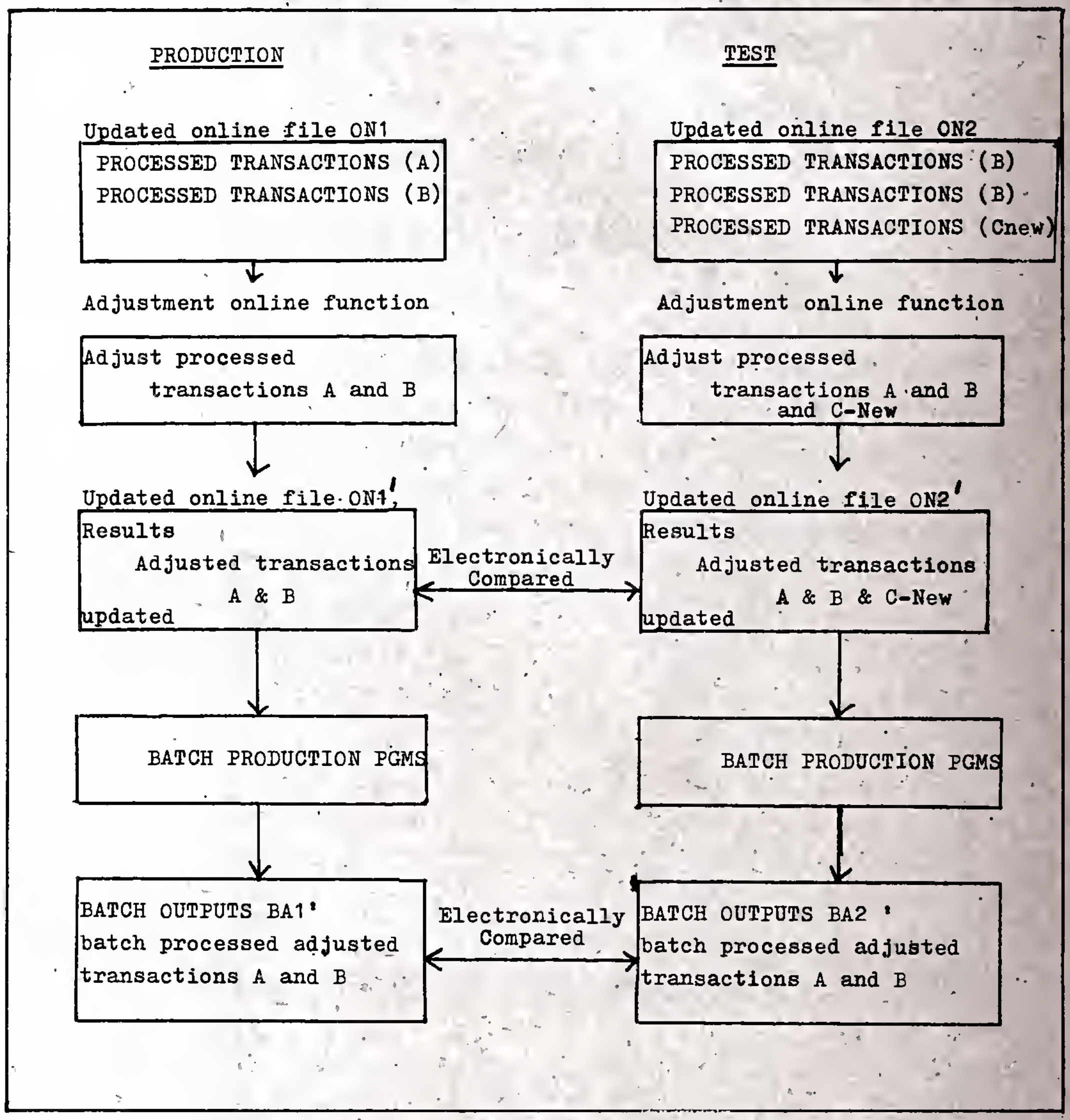
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PROCESSED TRANSACTIONS (B)
Updated online file ON2
PROCESSED TRANSACTIONS (B)
PROCESSED TRANSACTIONS (B)
PROCESSED TRANSACTIONS (Cnew)
Adjustment online function
Adjustment online function
Adjust processed transactions A and B
Adjust processed transactions A and B and C-New
Updated online file ON1'
Results Adjusted transactions A & B updated
Electronically Compared
Updated online file ON2'
Results Adjusted transactions A & B & C-New updated
BATCH PRODUCTION PGMS
BATCH PRODUCTION PGMS
BATCH OUTPUTS BA1' batch processed adjusted transactions A and B
Electronically Compared
BATCH OUTPUTS BA2' batch processed adjusted transactions A and B

Figure 4

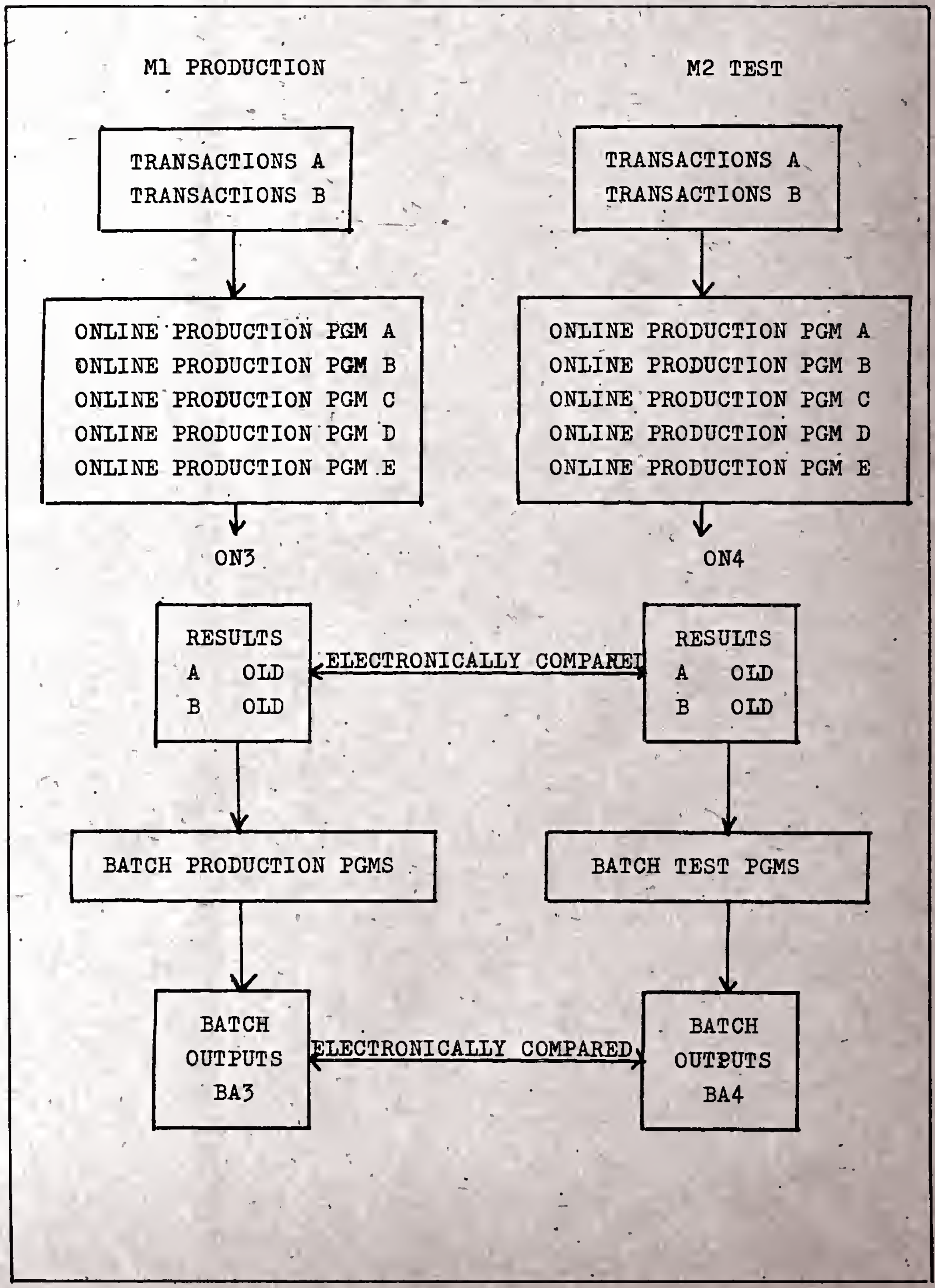

Figure 5

*(Continued from In Depth/20)*

(whether on-line or batch programs.)

For example, if a change or addition were made to the "on-line" production system, the user would run his model set of transactions through the system using production on-line programs and batch production programs, saving all files from that run. He would then process the same transactions, plus any additional transactions needed to test the change, using all on-line and batch production programs, except those on-line programs which have been modified or added, that is, the on-line test programs, saving all files from that run.

He would then electronically compare the one set of files against the other (Figure 3).

To test a program change or addition to the on-line system, one needs three sets of files (three data sets) holding the model set of transactions (call them M1, M2 and M3). M1 would hold all model transactions to be run through the system when only production programs are being executed. M2 would hold all model transactions that were contained on M1 plus the additional new transactions about to be tested. M3 would hold the same transactions as does M2 for backup purposes.

Three copies of all test on-line files would also be needed. Call these sets ON1, ON2 and ON3. Set ON1 would be updated when executing on-line production programs using the model test transactions file M1. Set ON2 would be updated when executing all the on-line production programs except the one or more test versions as shown in Figure 3. Here, the model set of test transactions M2 would be used. The set ON3 would be used to reinitialize ON1 and ON2, after all the testing has been completed.

Since the testing involves an on-line change, the user would electronically compare set ON1 against set ON2. Any differences should be accounted for specifically in terms of the change or addition to the on-line system.

Sets ON1 and ON2 would then be utilized by the production batch programs.

### Batch Outputs

Two sets of batch outputs would be produced. Set BA1, created by using the on-line set of ON1 as input, reflects the processing using all on-line production programs; set BA2, created by using the on-line set ON2 as input, reflects the processing using the on-line production programs along with the on-line test versions.

Sets BA1 and BA2 would then be electronically compared and, again, any differences between the test and production sets must be accounted for.

Once the results are verified correct, other on-line functions of the updated history must be tested. For example, if a transaction produces a payment which has been correctly processed but incorrectly entered, then an on-line function must exist to correct the finalized batch product.

This function must be applied to both updated sets of on-line files, ON1 and ON2, using production and test programs respectively. Of course, we are now updating, on-line, data which has already been processed by both on-line and batch systems. Call these files ON1' and ON2'. Once this is accomplished, both sets of files (ON1' and ON2') containing the updated transactions must once again be electronically compared and then passed to batch systems for processing. (See Figure 4.) The batch files created, BA1' and BA2', would then be electronically compared for verification.

### Change to Batch System

The same process that tests on-line changes would be used to test batch modifications. However, when the model transaction sets M1 and M2 are run through the on-line systems, we would use production on-line programs in both runs. (See Figure 5). Also in this case the M1 transaction would be identical to the M2 transaction.

That is, we process M1 transactions using production on-line programs, producing files ON3. We then process M2 transactions, using production on-line programs, producing files ON4. ON3 and ON4 are then electronically compared. There should be no difference.

The transactions set up to test the batch system change exists on both M1 and M2. Since we are using on-

*(Continued on In Depth/26)*

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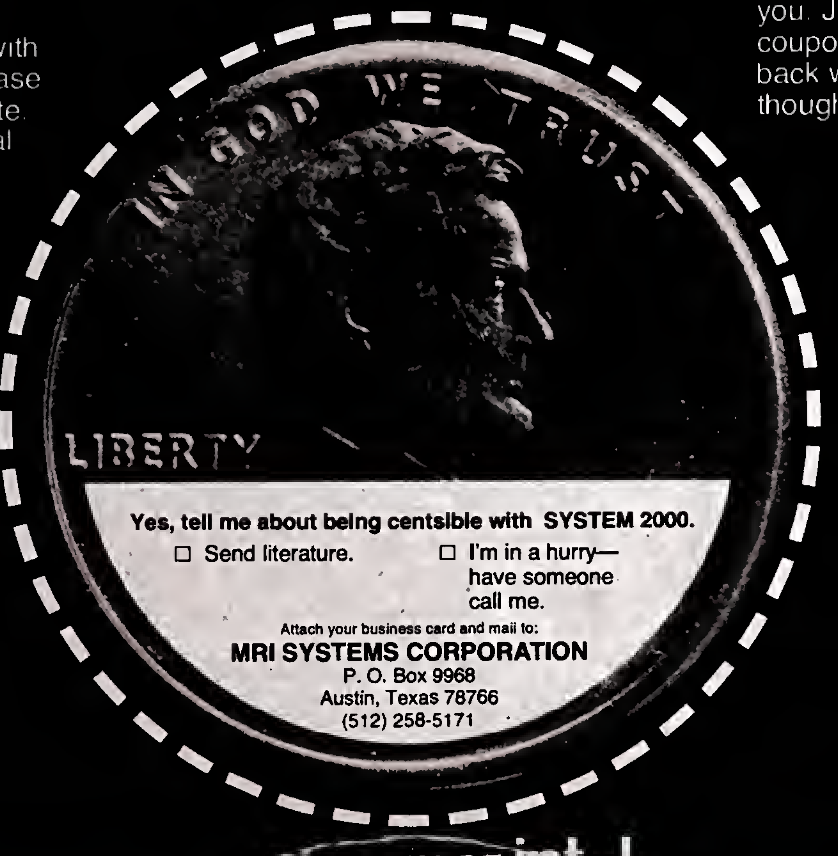

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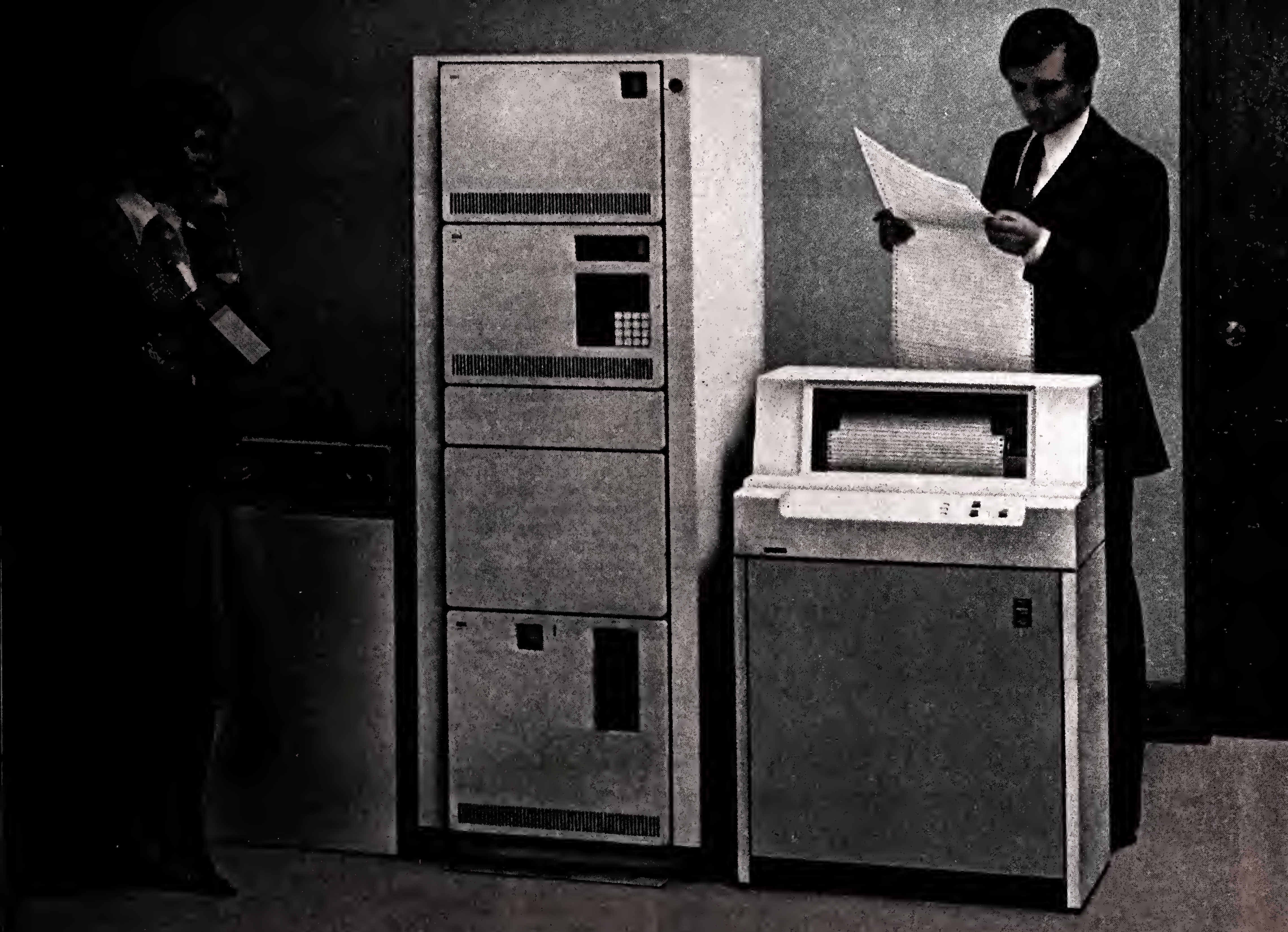

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(Continued from In Depth/23)

line production programs to process M1 and M2 transactions, the files produced (ON3 and ON4) should be identical. We then run ON3 through the batch system using all production programs and ON4 using the batch production programs along with the batch test programs that have been changed, producing batch files BA3 and BA4. These files are then electronically compared for verification.

Once again, we should test any on-line functions that are used in conjunction with updating transactions that have been processed by batch. That is, we should use the on-line functions to update transactions that have been processed by batch. Call these files ON3' and ON4'. These files are now electronically compared. They are then processed through batch production and test systems, producing batch files BA3' and BA4', which are electronically compared (See Figure 6).

Up to this point, we have been discussing testing changes made to production on-line programs where no changes were made to batch production programs, or where changes were made to production batch programs but none to the production on-line programs.

A system modification where both on-line and batch production programs are changed should be tested as follows: Run the test, as described above, for changes made to production programs, for an on-line system change. Once the on-line data is verified correct, run the test as you would for changes to the batch production system (See Figure 7 on In Depth/30). This, of course, is a more complex change and the testing results should be carefully analyzed before the changed programs enter the production mode.

### Resource Testing

Making changes that add a large volume of data to the system requires additional testing of the following:

**1) On-line response.** On-line response time should not be diminished to the point where it causes a hardship to the users. This should be verified by having the users input transactions on as many CRTs as they would ordinarily use in a production mode. Several persons should time the response for each on-line function. Testing should take place during the peak hours of computer activity to establish a true performance level.

**2). Hardware and operations.** Testing should use as many tapes or packs as would be used in a production mode for both on-line and batch processing. Make it a full test. Create as much volume as would be produced once the change is in a production mode to verify that the hardware and software will function correctly for on-line and batch processing and that the operations staff can function without serious difficulty.

**3) Backup and recovery.** The present production backup and recovery functions should be tested. Certainly any change which will generate a large amount of volume will affect the backup and recovery functions. A forced system failure should be induced and the backup recovery func-

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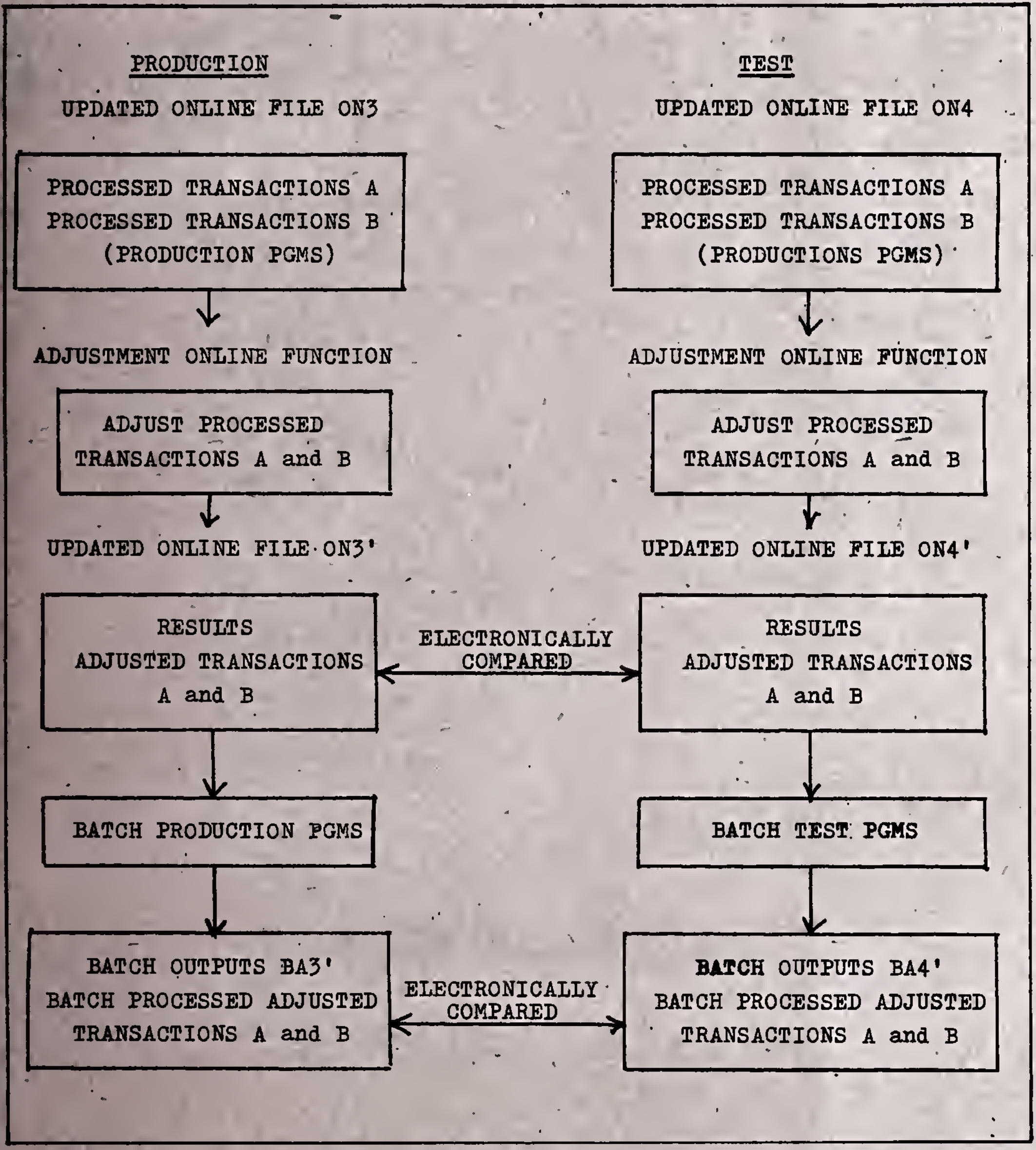

Figure 6

tion tested to ensure that the integrity of the files is maintained.

Once management has decided to create a structured testing path, personnel must be assigned. As always in the creation of any team, it is vital not only to have people of quality but also enough of them to accomplish the task. That is, the team must be able to establish the desired test data, set up the necessary files, test the procedure before using it, allocate time for its use and to some extent be diplomatic about the whole thing. No one likes to make errors; however, in the programming field they will always be made. The system test team should be aware of this when they find programming errors during testing. Their job is to find errors, not to criticize.

Testing may have to take place off hours. If this is the case management should make sure the system test team has enough people so that no one individual must constantly stay after hours. Management should also compensate these individuals accordingly, as theirs is no easy task.

### When to Use Test Plan

Utilizing this structured procedure takes time. How much time depends on the complexity of a particular system. One person on the project must be the decision maker. He must decide what changes will require use of the structured testing path.

For example, is it necessary to test, as outlined above, a simple one-line change? Especially when the user is pushing to have the modification in a production mode as soon as possible?

The factors to be considered in making that decision are:

1) The ability of the programmer making the change.

2) The time frame given to make the change.

3) The quality of the programmer's testing.

Indeed, the decision maker's task is not easy; we've all seen one-line changes blow up a system. If he mandates no test and production bugs follow, he's in trouble.

Whomever is appointed decision maker must be willing and must be given an independent status. Management must make sure his decision cannot be changed or influenced by users or electronic staff. For better or worse, his decisions stand.

### Psychology to Testing

Once the structured path is developed and used, its very existence propagates less errors. That is, programmers usually test more efficiently in the unit testing phase because they must document and hand in a report on the method and extent of their testing.

In addition, the users are involved. The possibility of error is decreased because of the increase in communications.

The programmers are involved in the systems test and, as a result, become familar with testing techniques — if they weren't already. They also become more aware of the user's problems, since the system test takes place with both user and programmer involvement.

The user becomes more aware of the

*(Continued on In Depth/30)*

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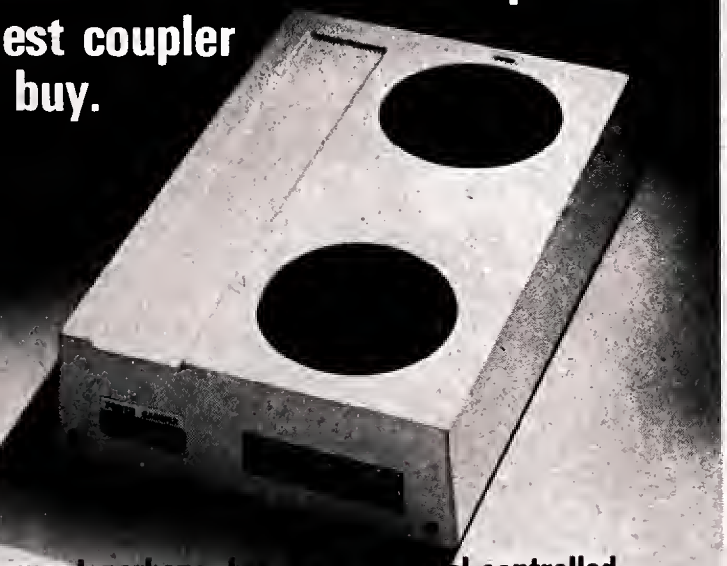

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*(Continued from In Depth/27)*

complexity of programming and testing. As a result, he tends to take a more realistic approach when assigning a task to be completed by a certain date. In effect, the user learns more about what is involved in making a programming change. Inherent in the path is the common involvement of user and programmer, both now dedicated to one purpose — putting a modification into a production mode with no bugs.

It's no easy task to set up the above procedure. However, it's no easy task to correct the damage done by a bug that's been in the system for two months.

In today's DP market, the demand far exceeds the supply. Personnel turnover is a constant problem. Many shops are left with production programs and no programmers familiar with the code. As a result, many changes are made on the fly.

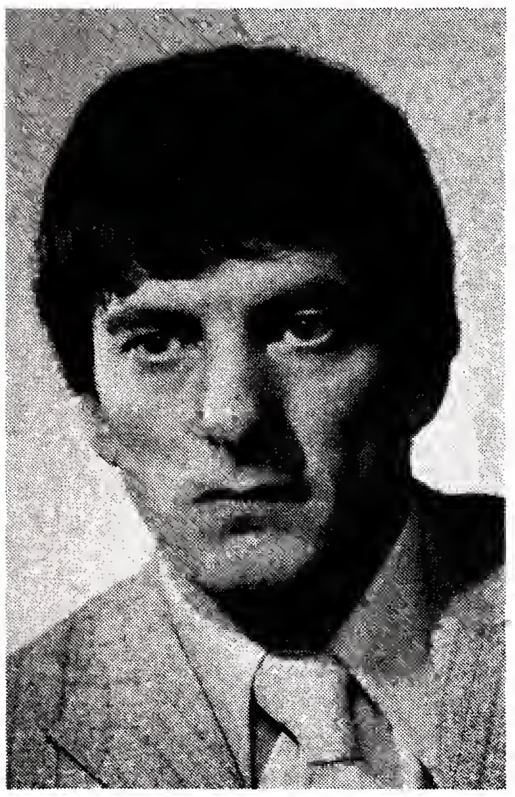
If testing is inadequate, a vicious cycle begins. Specifically, the users request a change needed quickly. A programmer is assigned who is not readily familiar with the code. The change is made and tested to some degree.

Most of the time negative testing is not utilized. Production bugs appear. Then changes must be made to correct the production bugs. Those changes may correct the production problems but cause other errors.

The cycle has begun. Changes cause bugs and program fixes to correct the bugs invariably cause other bugs which in turn must be corrected by even more changes. Inadequate testing lends itself to the continuation of this cycle.

Indeed, there are programs executing in a producing environment with bugs that no one knows about. Unless DP shops employ a structured testing approach which is used correctly, the number will certainly increase.

The usual philosophy of management is that since time is short and competition between companies is swift, speed is essential in implementing changes. That's the real world of programming. Our only balancing effect is a structured testing approach. It should be utilized in all DP shops before we lose control if we haven't already.



*Edward C. DeVito Sr. is president of Datum Consultants, Inc., Forest Hills Gardens, N.Y., a consulting firm specializing in large-scale commercial, financial and insurance DP systems.*

*DeVito spent the last year developing a structured testing path for Metropolitan Life Insurance Co. He is presently at work on a large-scale conversion system for the same company.*

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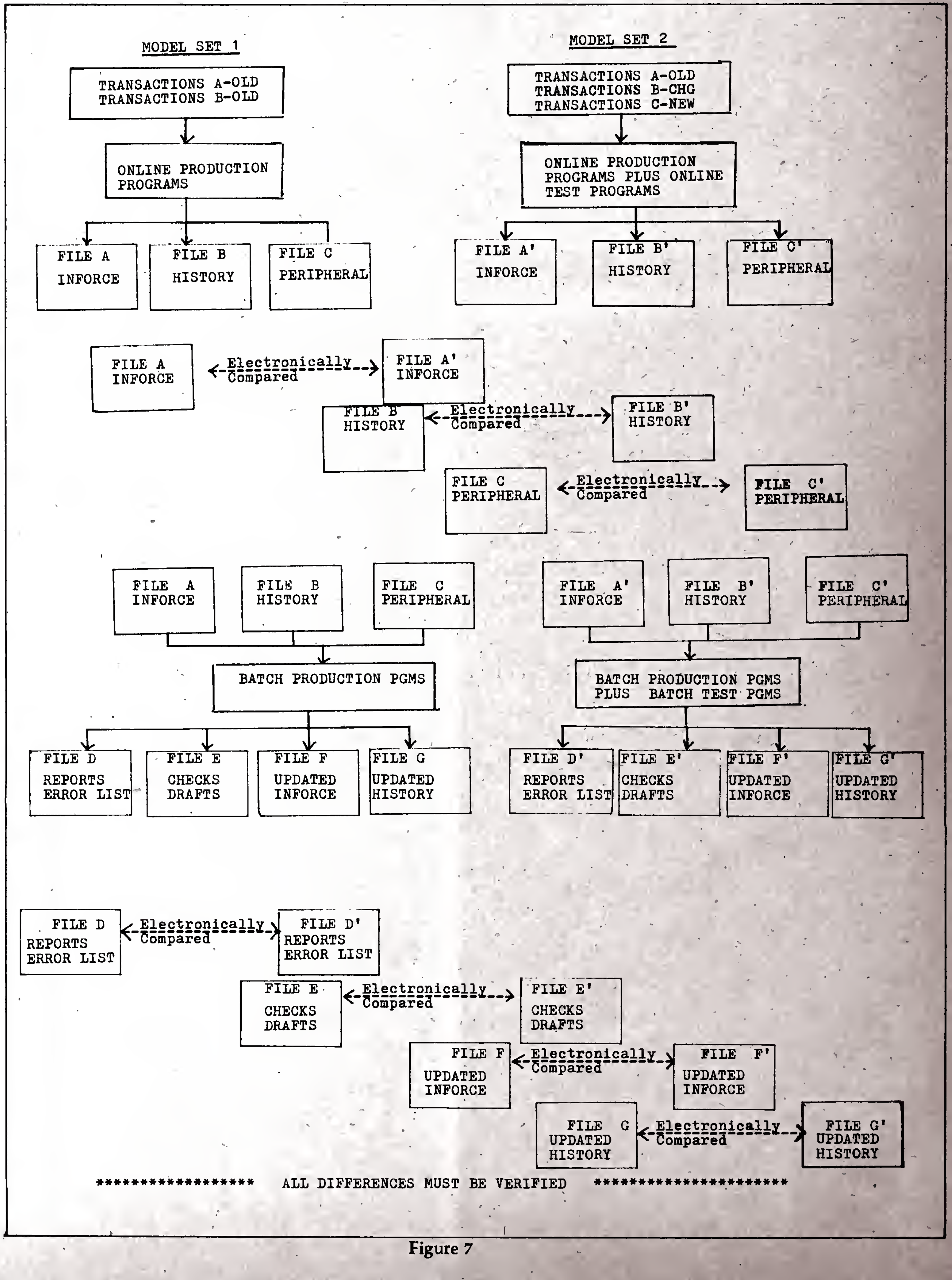
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Figure 7

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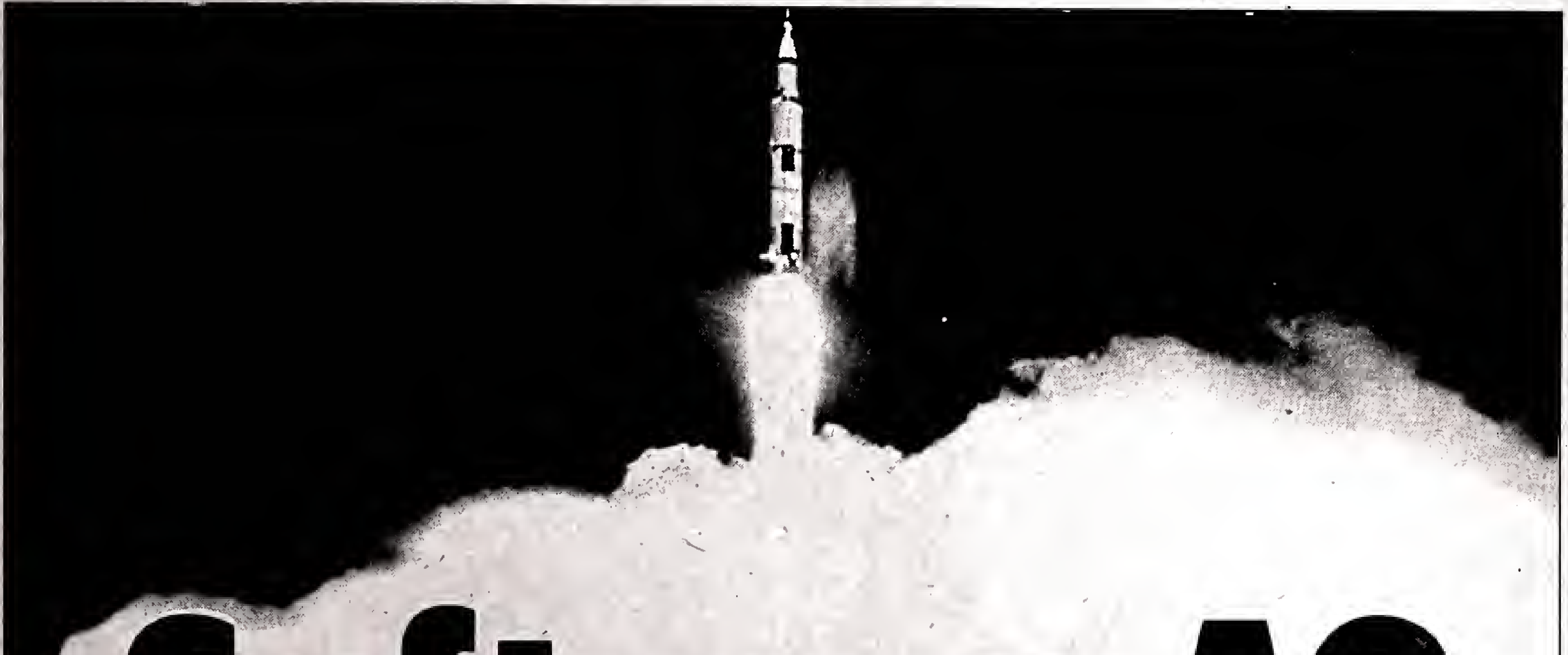

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Live in sunny Austin, Texas, an area noted for its lakes and year-round recreational activity. With its clean air, low taxes, and lack of urban congestion, Austin is ranked as one of the ten most liveable cities in the United States. Texas Instruments' rapidly expanding Computer Product facility in Austin needs qualified experienced personnel in the following areas of expertise:

### Manager of Technical Writing

Manage 30-40 hardware and software writers, including 2-3 supervisors, to prepare documentation for minicomputer systems and related peripherals. Responsible for recruiting, training and personnel matters. Minimum of 8 years directly related experience in technical writing with a minimum of 3 years supervisory experience.

### Lead Software Writers

Coordinate, research and write computer programmer guides, users' manuals, etc., from development data and personal interviews. Must be familiar with operating systems structure and programming languages. Requires a minimum of 3 years directly related writing experience.

All positions require a college degree or equivalent experience. TI offers competitive salaries and a full line of benefits including company-paid relocation. If you have talent, experience and a keen interest in making the most of your career, we have the challenge and opportunity for you.

Call us now to schedule an interview. Call collect (512) 250-7440 during normal business hours. Or send your resume in confidence to: Staffing Manager/P. O. Box 2909, M.S. 2208/Austin, TX 78769.

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Data Processing

# MIS PROFESSIONALS

## Seattle, Washington

Fluke Mfg. Co., is a leading manufacturer of electronic instruments. Rapid corporate growth has created exciting opportunities in our MIS Department.

### Manager - Manufacturing Systems

Manage and direct a team of analysts and programmer analysts engaged in the design and implementation of advanced manufacturing systems. Our MIS plans call for new Master Scheduling, Purchase/Receiving, Stores Retrieval, and Shop Floor Control Systems. Integration with our new net change, MRP will be essential. Other responsibilities include Bill of Material, Finished Goods Control, Work In-Process Control. This position requires thorough familiarity with state-of-the-art manufacturing systems, excellent communications skills and broad, business oriented thinking.

### Sr. Programmer Analyst - Manufacturing

Play a key role in design and implementation of new manufacturing systems. (See above). Position requires 5 years experience in a manufacturing environment, expertise in COBOL and data base, strong user interface skills.

### Sr. Programmer Analyst - Finance

Put your 5 or more years of experience to work and help us install a new payroll/labor distribution system, G/L, A/P, A/R packages, using our IDMS data base. Candidates should have an accounting background, be proficient in systems design and COBOL programming. Familiarity with manufacturing is preferred.

### Sr. Programmer Analyst - Marketing

Our current on-line Order Processing System must be replaced. The scope of the new system includes the on-line capture of customer orders, interface to Master Scheduling, Finished Goods and Accounting, Sales Analysis and Marketing information. If your qualifications include two or more of these areas plus an in-depth knowledge of COBOL, DB and DC, you may find this opportunity irresistible. Five years of related experience is required.

### Programmer Analyst

We need two individuals with three to five years' experience using BAL and/or COBOL. They will work on a variety of applications in a dynamic, challenging environment. Assignments require the ability to get the job done in a professional manner with minimum supervision. These positions have excellent potential for advancement.

### Present Equipment and Software

IBM 370/158, 370/138, 3270 Network.
DOS/VS, COBOL, BAL, TASKMASTER, IDMS, Librarian on-line.

### Plans

IBM 4341 - May 1980
IBM 3031 - Dec. 1980
HP 3000 to interface with Europe
VM, CMS, CICS, DLI

We offer a liberal compensation and benefit package that includes semi- annual profit sharing. Please send your resume with salary history to: **Steve Riggs, Personnel Department, John Fluke Mfg. Co., Inc., P.O. Box 43210, Mountlake Terrace, WA 98043.** We are an equal opportunity employer.

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# MANAGER, SYSTEMS AND PROGRAMMING

PCHA, the 1300-bed multi-hospital authority in Michigan, has a challenging career opportunity for a Manager of Systems and Programming.

Experience should include 3-5 years of proven supervisory ability in data processing, with emphasis on hardware/ software evaluation, preferably in health care setting. A Bachelor's degree is required, and a Master's degree is preferred but not mandatory.

If you're self-motivated with leadership abilities and can interface well with all levels of operations, we'll offer an excellent salary and benefits package, plus solid opportunities for advancement. If qualified, please forward a resume with salary history to:

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- Assessing the operational efficiency, management practices, and organizational effectiveness of data processing installations. Applicants for these positions should have experience in EDP management, EDP auditing, or EDP management consulting.
- Performing capacity planning studies, which include workload requirements analysis, configuration sizing and communications network design and evaluation, and providing ADP procurement assistance in such areas as benchmark design, specifications development, proposal evaluation and life-cycle planning. Applicants for these positions should have experience with hardware and software evaluation and with computer and/or communications systems modeling techniques.
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# Systems Architects/Systems Analysts/Programmers

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  — Development of fifth generation multiprocessor large GP systems with virtual memory capability
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- Compiler Design
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- Develop/Execute test for Software Evaluation
- Audit Software Development

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- System design of multiprocessor distributor logic systems
- Design/Implement Distributed Processing Systems using VLSI technology
- Systems Performance Measurement

**TESTWARE DEVELOPMENT**

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- Develop and execute integration and test plans
- Specification review/ analysis and liaison with developers
- Monitor and evaluate test results

**MIS APPLICATIONS**

- COBOL, On-Line Business Programming

**For prompt attention, send confidential resume and salary history to: Mr. George Rice, Manager, Professional Placement, Engineering and Manufacturing, Dept. D50, NCR Corporation, 16550 W. Bernardo Drive, San Diego, CA 92127.**

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### NCR Systems Engineering/ Scripps Ranch

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*We have immediate openings in these areas:*

### Firmware Systems Analyst/Programmer

You'll be part of a small group implementing virtual machines on the I-8400 and other families. These virtual machines emulate a block structured, stack oriented architecture and COBOL run time environment. Preferred experience: Firmware development, assembly language programming, I/O, and block structured languages or COBOL.

### Systems Analyst/Programmer

You will be part of a small group designing and implementing advanced system software for the I-8400 family and future mainframes. These systems will support interactive multiprogramming environment with virtual memory capability. Programs are written entirely in high-level, Pascal-based language. We seek experience In, or exposure to operating systems development, compiler construction, tools development, and high-level, block-structured software.

### Configuration Management/Systems Analyst

You will be part of a small select group responsible for the integration of software, firmware, and testware. Systems to be tested are I-8400 Family which has interactive, multiprogramming, and virtual memory capabilities. Duties include functional specification review, test bed development, monitoring and evaluation of test results, and coordination with software developers and marketing. Preferred experience: cobol, microcode, assembly or high level block-structured languages. Background in firmware, testware, or applications programming plus ability to communicate effectively.

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You will play a leading technical role in the design, and implementation of Data Base Management Systems including Data Dictionary Facilities Query/Update Languages, DDL Compiler, Data Manipulation Languages and Data Base Utilities. This will include defining architectural requirements for an advanced distributed data base system. We seek a minimum of 5 years experience in data management systems software design with familiarity of both network and relational data base architecture.

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You will also sell our very successful professional productivity improvement program, which uses top-of-the-line TI programmable calculators, to high level management of Fortune 1000 corporations. This rapidly expanding market already includes over 200 major corporations enjoying substantial white collar productivity increases. You will be instrumental in helping large quantity buying customers solve their unique computational needs with customized Solid State Software™ modules designed to their specifications.

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## D.P. MANAGER OF SYSTEMS AND DEVELOPMENT

Diversified heavy and highway and materials supply construction firm, headquartered in Boulder, Colorado has an immediate opening for a Manager of Systems Development in a medium-size shop. Requirements are 3-4 years minimum experience in project design, development and managements in an I.B.M. System 3 environment using COBOL and RPG languages. I.B.M. Series 1 and on-line applications experience would be helpful. Related degree is preferred. Complete fringe benefit package. Salary commensurate with qualifications and experience.

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Company paid retirement, medical, dental and life insurance and liberal vacation plan. Salary commensurate with work and educational experience.

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Now you can compare your current salary with thousands of other computer professionals working in or near your geographical area. Source Edp, North America's largest recruiting firm specializing in the computer field, has just compiled a timely survey of local salaries in the computer profession. The survey covers all areas of professional discipline in programming, software, information systems, marketing, etc. It shows salaries by length of experience, size of installation and includes all management levels. You can also compare your current compensation on a city-by-city basis with salaries paid in metropolitan areas across the U.S. and Canada as well as national averages.

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2-4 years in-depth experience in the industrial electrical/electronic industry. Work experience in N/C controllers and related peripheral equipment; computers and distributed data computer control system. Good oral/written communication for an engineering environment a desirable asset.

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2-4 years experience in electronic circuit design. BSEE required.

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**KEARNEY & TRECKER CORPORATION**
Personnel Department, 11000 Theodore Trecker Way,
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# MANAGER,
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## SENIOR SYSTEMS ANALYST

BS Degree with CDP and five years experience as Senior Systems Analyst. Heavy Systems analysis or operations research required. Must be competent in COBOL, Fortran, PL1, Basic and IDEA languages. Experience with higher math, statistics and health care management concepts desirable. Will be responsible for computer program design and project leadership.

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CHSD

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**Programmer-Analyst**
**($11,311 - $18,181/yr)**
Bachelor's degree preferred with 3-4 years programming/systems experience. Would prefer experience in an education setting. Duties include design and implementations of a student informations system.

**Systems-Analyst**
**($13,111 — $19,981/yr)**
Bachelor's degree in business or computer science with five years experience, preferably in higher education. Duties include analyzing and developing applications for a wide variety of business and educational uses. Must possess ability to communicate with computer systems practitioners and lay users.

**Apply before September 30, 1979.** Specify job being applied for.

Apply to
Personnel Office
**Cochise College**
Douglas, AZ 85607
Equal Opportunity
Employer M/F

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# FIELD ENGINEERS!

**HERE** is a dynamic rapidly growing company specializing in equipment sales and maintenance world-wide.
**NOW** is your opportunity to join a company that has pride in its people.
**ASC** is a people oriented company...no more being just a number or another F.E.
**THIS** is an excellent opportunity for talented F.E.'s to obtain recognition and advancement, financially and otherwise.
**WE have** openings in commercial and government accounts nationwide. Technicians specializing in:

**DEC 10/KA, KI, & KL**
**DEC 11 Series DEC 20**
**G.E./Honeywell**
**Minis...send your resume to: ASC**
**4600 Duke Street, Suite 303**
**Alexandria, Virginia 22304**
**(703) 823-1530**

ASC
AMERICAN STANDARD COMPUTER CORP.

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# Make THE Software Development Connection

**Make the right connection . . . the connection to Sperry Univac Mini-Computer Operations in Irvine, California. We're seeking software development professionals capable of assuming responsible roles for our many exciting and challenging projects.**

### Software Sustaining

Requires a BSCS or equivalent with a minimum of 2 years minicomputer experience. Knowledge of compiler development maintenance helpful. Responsibilities will include maintenance enhancement of language processors (e.g. COBOL, RPG II, PASCAL) and operating systems.

### Applied Software Development

Several positions available requiring BSCS and 1-9 years experience in mini-computers and assembly language programming. Must have the ability to prepare technical and administrative reports, and the most senior level candidates must be able to assume project leadership. Responsibilities will include development of applications packages for unique customer needs and for company products. Will also develop diagnostic packages and make enhancements to operating systems and language processors.

### Software Quality Analysts

Two positions available requiring BSCS or Math. One position requires minimum of 9 years experience and the other a minimum of 6 years in software development. A solid background in QA is preferred. The senior level candidate must have the ability to assume project leadership and both must be able to prepare technical and administrative reports. Customer contact or user experience desirable. Varied responsibilities will include defining and writing standards and procedures for software quality assurance, release of all new software products, software system test planning and project coordination.

### Operating Systems Development

Requires a BSCS/BSEE with 3-5 years experience in design and implementation of data communication software in an operating systems environment. Knowledge of high language levels a plus. Experience with line and network protocols desirable. Will design and implement various modules of new data communication driver processors.

### Data Base Management

Requires a BSCS/MSCS with minimum 3 years experience in minicomputer on-line interactive/operating systems development and file system development. Knowledge of mini-computer systems programming with assembly language and PASCAL desirable. Will design and implement modules within an on-line interactive/operating system.

### Diagnostic Software Development

Requires a BSEE or Computer Science or equivalent and minimum of 2 years in micro diagnostics with software and hardware background. Responsibilities will include development of micro diagnostics (CPU, Memory) and on-line system diagnostics for computing systems.

### Software Technical Support

We have a senior level position for an individual with a BS in Business or Computer Science or relevant experience. Requires system level training experience in Univac 1100 EXEC 8 operating system and 1100 assembler language. You will provide technical support regarding the 1100 systems and system/application programming as needed.

**A career with Mini-Computer Operations offers you a stable, rewarding career, accompanied by a compensation package that is second to none in the industry. Submit your resume in complete confidence to the address below, or phone Employment at 714/833-2400, Ext. 327, for additional information.**

SPERRY UNIVAC

**MINI-COMPUTER OPERATIONS**
**2722 Michelson Drive • Irvine, CA 92713**
A Division of Sperry Rand Corporation
Equal Opportunity Employer M/F

# We're asking a lot. We'll give you a lot more.

## Hughes Support Systems needs software professionals who are professionals.

Can you handle significant software responsibilities in our high-technology engineering environment?

We are responsible for automatic test systems in many areas: radar avionics, missile and electro-optical programs, and mission trainer-simulators. And those responsibilities keep growing, creating more and more good software jobs here.

In exchange for your desire and ability to do an outstanding job in real-time interactive graphics computer-based test systems, and other complex applications, we're offering a great package:

- Small-company atmosphere where your contribution can be seen and will be rewarded
- At the same time, the stability that comes from being part of Hughes Aircraft, the electronics leader, with its $4 billion backlog of work comprising more than 1500 different projects
- Excellent salary and benefits
- Great place to work, near LA Airport and beach communities

If that combination looks good to you, let us know which of these jobs you're qualified and eager for:

### Programmers and Analysts

Experience in real-time systems development, quality assurance, or program validation is a must. You'll design, code, and check out computer programs and modules used in ATE and in trainers and simulators controlled by mini and micro-processors.

### Senior Systems Programmers

If you've really learned your way around real-time executives, operating systems, and I/O device handler developments, we have plenty of programs to challenge you.

### Senior Systems Analysts

You need a strong software engineering background with experience in modern systems development or heavy database management and distributed processing systems.

### Senior Software Engineers

To get one of these jobs, you must be a senior-level- professional who can generate clear and concise software requirements into a software implementation activity. Your experience must include conceptual and preliminary design, and real-time applications in both multi-programming and multi-processing. If you have that background and you're unusually good at applying it, the sky is the limit.

Don't let the future get away. Send your resume right away to Bill Campana, Professional Employment 130/4, Hughes Support Systems, Dept. 109, P.O. Box 90515, Los Angeles, CA 90009, or call him collect at (213) 641-6691.

**HUGHES**

HUGHES AIRCRAFT COMPANY

**SUPPORT SYSTEMS**

U.S. CITIZENSHIP REQUIRED

Equal Opportunity M/F/HC Employer

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# PHOENIX

Sperry Flight Systems, a leader in the design and manufacture of aerospace avionics systems, has an attractive career opening in the information systems group.

## Senior Systems Analyst

This individual will interface directly with users of D.P. services to define requirements and will design, specify and implement systems.

A BS degree is preferred, but we will consider equivalent experience in general accounting, manufacturing control or industrial engineering, along with strong interpersonal skills. Experience with data base management or distributed processing is a plus.

Sperry offers an attractive salary and benefits package and the superb lifestyle of Phoenix, Arizona. Send your resume and salary history, in confidence, to Joy Vogelgesang.

**SPERRY**
**FLIGHT SYSTEMS**

P. O. Box 21111
Phoenix, Arizona 85036

We're an Equal Opportunity Employer, M/F/H.

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# SYSTEMS PROGRAMMER

The Academic and Technical Services group of the Fordham University Computing Center has an opening for a systems programmer. The Computing Center services the administrative, research, and instructional needs of the University with a DECsystem-20 located at its Rose Hill campus in the Bronx, and remote batch and timesharing facilities at its Lincoln Center campus in Manhattan. The systems programmer will maintain system software, ensure the integrity and security of the system, and provides outstanding benefits and an educational environment, with opportunity to pursue the University's programs of study.

Send resume to:

**Director**
**Computing Center**
**Fordham University**
**Bronx, New York 10458**

*An equal opportunity employer*

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# RACINE, WISCONSIN

Join a growing team of professionals using a Honeywell 64/20 computer and converting to GCOS. We are looking for highly qualified people in the following areas:

## SYSTEMS ANALYST

This person will have at least 2 years experience in on-line and/or financial systems, will have a degree from an accredited college or university, and be a self-starter who enjoys a variety of assignment.

## SENIOR PROGRAMMER

This position requires a high degree of technical ability, with real time porgramming experience a must. Will also oversee the work of other programmers.

## PROGRAMMER

Our programmer will have an associate degree or better in Computer Science or related background, will work well individually or as part of a team, and will have some background in on-line and/or financial systems.

## COMPUTER OPERATOR

This position offers excellent exposure and opportunity for advancement.

Racine County offers a challenging environment with excellent salary and fringe benefits. Qualified applicants should submit resume with salary history/requirements to:

**Racine County Personnel Director**
**730 Wisconsin Avenue**
**Racine, Wisconsin 53403**

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# PROGRAMMER ANALYSTS

## SEATTLE/PORTLAND

| | | |
|---|---|---|
| **Systems Programmers** | IBM 370, OS/VS1, VM, CICS or IDMS Internals | to 30K |
| **Analyst** | 3 years development, IDMS, CICS | to 28K |
| **Analyst** | Fin. or manufacturing. Degree preferred. | to 27K |
| **Analyst** | Transportation & Financial | to 26K |
| **Analyst** | Trust with Savings Institution | to 25K |
| **Sr. P/A** | Health care, financial systems, PDP 11/70, COBOL | to 24K |
| **P/A** | Manufacturing, S/34, RPG II | to 23K |
| **P/A** | Retail development, IMS or CICS, COBOL | to 21K |
| **P/A** | HP3000, SPL, IMAGE, QUERY | to 22K |
| **P/A** | Banking applications, COBOL or BAL | to 22K |
| **P/A** | COBOL, MRP, Const. Mgmt., D11, CICS | to 22K |
| **P/A** | COBOL, G/L or PCS | to 22K |
| **P/A** | Distribution, COBOL, Order entry | to 21K |

For complete confidential representation regarding these and other Seattle/Portland positions, send your resume to:

Houser, Martin,
Morris & Assoc.

**(206) 453-2700**
**1940 116th Ave. NE**
**Bellevue, WA 98104**

As a West Coast member of the National Computer Associates, we can also assist you in finding positions at other West Coast locations and nationally.

**23 Offices Nationwide to Assist You**

# CALIFORNIA

**LOS ANGELES**
Major mfg. co. needs several P/A's with 370 DOS BAL exp. Prefer DROMP of ISAM but not req. Excellent benefits (tuition, stock savings plan, flex hours) plus full relocation.

**SOUTH BAY**
Large financial org. planning implementation of several major on-line systems seeks Sr. P/A's to join their team. Co. is located in a beautiful suburban industrial park just minutes from the Pacific. Reqmnts. include COBOL or BAL for large scale IBM OS systems. Salary $26,000.

**SANTA BARBARA**
Beautifully located data center.Environment includes 370/158 under MVS/TSO using COBOL. Needs P/A's to work on financial/distribution applications. Salary to $26,000 and full relocation.

**WEST LOS ANGELES**
Large computer services firm needs technical representatives/programmer analysts. Little prog'g will be involved. IBM OS/VSII. Mark IV or CMS bkgd. Salary to $24,000.

**LOS ANGELES**
Major retail co. needs a systems control programmer with 3+ yrs. sys prog with business application design and a working knowledge of COBOL, BAL, and VS-1. Co. offers benefits and state-of-the-art technology. Salary to $26,000.

**the jarvis walker group**

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(213) 670-7353

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# Programmers

## at all levels

## CONTROL DATA AND YOU. . .
## . . .THE POSSIBILITIES ARE ENDLESS.

If you're looking for a career opportunity that offers unlimited growth potential and lots of diversity, you've found it with Control Data Corporation! As a pacesetter in the computer industry, we have the size and resources to keep your mind stimulated and your career moving. Our activities are so numerous, so advanced, and so varied that you'll never run out of exciting challenges. If you'd like to take advantage of our leading technical expertise, then consider the following opportunities:

### Compiler Development

**(Opportunities exist in Sunnyvale)**

If you have knowledge of compiler theory and construction, and a working knowledge of ASSEMBLY and higher level languages, you should consider these opportunities:

* Common Code Generator *
* FORTRAN Math and I/O Libraries *
* COBOL Compiler projects *
* PL/1 Compiler projects *
* Record Managers and I/O processing *

### Communications Software Field Support

**(Opportunities exist in Sunnyvale and Anaheim, CA)**

These positions require communications and large systems experience to provide technical and consulting support to customers worldwide on communications and network software for CYBER 170. (Sunnyvale) and CYBER 1000 (Anaheim). Tasks involve:

* Problem Diagnosis *
* Development and teaching of seminars *
* Consulting to customers *
* Technical writing *
* Special project design/implementation *

Control Data Corporation offers an excellent salary and comprehensive benefits package including flexible work hours, medical and dental insurance, paid vacation and sick leave policy, 100% tuition reimbursement, and short and long term disability.

If you're ready to begin a career with the leaders, please call or submit your resume (or letter of interest) with salary history/requirements to **K. Beaudet, Control Data Corporation, 215 Moffett Park Drive, Sunnyvale, CA 94086. (408) 734-7434.**

CONTROL DATA CORPORATION

**More than a computer company**

An Affirmative Action Employer

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# NEN Redefines Opportunity

**Application Programmers**

**Programming Project Leaders**

**Systems Analysts**

**Sr. Systems Analysts**

Because we're not going to plug you into an existing job. The growth of our company and our EDP Department are simply too great for that.

Our growth, upgrading our CPU three times in the past five years, has given us the flexibility to offer you a new career that matches your goals and background. We won't force you into a slot with an already strictly defined job description and duties. We'll build your new position around you.

These opportunities exist at both our Boston and Billerica, Mass. facilities. At either site, you'll enjoy the challenges, rewards, independence, and recognition that go with our small project team operation philosophy. Plus the professional growth your success will bring.

## About NEN...

New England Nuclear Corp. is the world leader in the development and manufacture of radiochemicals, radiopharmaceuticals and radioimmunoassay products for scientists, physicians and clinicians. Their use of our products to unlock medical mysteries and diagnose disease are helping to make a better, healthier world for everyone.

At NEN, we're also constantly striving to make a better world for our employees. Our commitment to providing an informal yet highly professional, goal-oriented atmosphere has helped us to record 25% annual growth every year since our founding in 1956. We now employ over 1,400 and our 1978 sales were $65 million.

NEN offers competitive salaries plus excellent benefits, including profit sharing, full medical/life insurance, tuition reimbursement, free parking.

Our environment consists of: 370/148, Power VS, Power RJE, 3270 CRTs, VSAM, COBOL, RPG- II , DL/1, On-Line Programming, DOS/VS.

**Our applications include: Order Processing, Accounts Receivable, Inventory Sales Analysis, Manufacturing, (COPICS), Financial, Purchasing. If your background reflects any of these areas, please forward your resume and salary requirements to Ed Saras at New England Nuclear, 549 Albany Street, Boston, MA 02118, or call him at (617) 482-9595. Find out how NEN can create a better career for you.**

An Equal Opportunity Employer

NEN New England Nuclear

**...A BETTER WORLD**

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# PROGRAMMER/ANALYST

Our company is a small property casualty insurance company with big company advantages, using MVS on an IBM 3033 with CICS/VTAM and a CRT on each programmers desk. TSO will be available 11/01/79. Currently we utilize on-line Panvalet and a host of other packages available to run with CICS.

In addition, you'll find the atmosphere and team attitude of a small shop with 8 programmers and analysts.

The current opening requires 1 — 2 years experience with COBOL, RPG or ALC. OS or MVS experience is preferred as is property casualty background.

Salary is open depending on experience. Send resume and salary requirements to:

**Great Central Insurance**
Attn: Greg Mall
3625 N. Sheridan Ave.
Peoria, IL 61633

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# User Consultant II
## University Computing

To provide counseling and information communication services to Users. Qualifications: 1) Bachelor's degree in computer science or related field or the equivalent combination of education and experience; 2) 1-3 years of programming experience; 3) experience in Statistical Application Programming. Salary range: $15,637 — $20,885. To be considered for the position a standard application may be obtained from and MUST be returned to:

**Eastern Michigan University**
**Personnel Office**
**112 CW Welch Hall**
**Ypsilanti, MI 48197**
**(313) 487-3430**

*AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER AND EDUCATIONAL INSTITUTION*

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# Consulting Opportunities

**Rogers and Associates** is a leading data processing consultant firm. Due to continued expansion, we seek highly motivated individuals with strong backgrounds in programming or system analysis. Successful applicants will possess outstanding interpersonal and communication skills.

**Openings exist** in our Canadian offices in Edmonton, Calgary, Regina, Vancouver and Victoria and in our U.S offices at San Francisco and Los Angeles. Individuals should have at least two years of experience with business applications using any of the following:

**Languages:** —COBOL, PL/I, RPG II, FORTRAN, BASIC-PLUS, MARK IV
**Equipment:** —IBM 370 series; OS, DOS, POWER/VS; TSO/-SPF, CMS; IMS, DL/I, CICS
—UNIVAC 1100 series; EXEC-8; ECL; DMS1100
—Honeywell 6000 series; GCOS; TSS; TDS, IDS
—Burroughs 6700 series; MCP; CANDE,GEMCOS; DMS II
—Dee 11 series; TOPS, RSTS/E; CCL, DBMS

**Rogers and Associates** offers an attractive salary and benefit program as will as planned personal development opportunities. If you possess the necessary skills and desire to pursue a career in consulting, we would be pleased to discuss your career plans in more detail.

**Please** reply in confidence to:

*Mr. Dennis Duggan*

**ROGERS AND ASSOCIATES**
**Management Consultants Ltd.**
**4355 99th Street**
**Edmonton, Alberta T6E 5E4**

## SENIOR PROGRAMMER

Batterymarch, an Innovative Investment advisor, needs a Senior Programmer for its in-house Time Sharing System to work on Transactions Systems, Management Information Systems and Investment Modeling. The candidate should be experienced in both Cobol and Fortran and be capable of working in an unstructured and challenging environment. Investment or Financial Systems Experience is desirable. **Send resume only to:**

**Beverly Cancelliere**
**Vice President**
**Batterymarch Financial**
**Management Corporation**
**600 Atlantic Avenue**
**12th Floor**
**Boston, MA 02210**

BATTERYMARCH
FINANCIAL MANAGEMENT
CORPORATION

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## EDP AUDITING

Big "8" Accounting Firm is seeking a qualified individual in the Hartford, Ct. area to join our growing EDP consulting staff. Primary responsibilities will be:

- Analyze and define audit tests to be automated in diverse client environments
- Utilize and implement audit assist software
- Review and test EDP controls

Experience should include programming and implementation of financial and manufacturing applications. Individual should be self-motivated and possess oral and written communication skills.

A career opportunity into EDP and management consulting can be achieved by the right individual. We offer a highly professional environment embracing challenge, continuing education and recognition of achievements.

Degree required. Starting salary up to $20,000. If you meet these requirements, send resume in confidence to:

**C.W.**
**Box 2072**
**797 Washington Street**
**Newton, Massachusetts 02160**
*Equal Opportunity Employer*

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## REAL TIME PROGRAMMERS & ANALYSTS

# *DISCOVER* SPERRY UNIVAC *IN ORLANDO*

**If you'd like to combine the ideal company with the ideal location then this is your opportunity. The Technical Services Division of Sperry Univac has immediate openings in Orlando providing software support on a Real Time Communications System.**

**We are seeking Programmers and Systems Analysts with a background on Military computers or 16 bit minicomputers, and Assembly language Programmers. Experience with PASCAL or other higher level languages is also desired. A Degree or equivalent experience is preferred.**

**Opportunities also exist in the Mid-Atlantic Region and on the West Coast**

For immediate consideration, write:

**John DePrima**
1901 North Moore Street
Arlington, VA 22209
**(703) 558-7200**

SPERRY UNIVAC
TECHNICAL SERVICES DIVISION
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## SYSTEMS DEVELOPMENT EXECUTIVE

Expanding growth has created an outstanding new executive opportunity in the Management Services Department of a major midwest transportation-resource company.

Responsibilities include short and long range planning, coordination of interface with user departments, major input in departmental decision making and total applications development in a large, modern and creative shop. Hardware includes numerous large scale IBM computers operating multiple telecommunications systems.

Candidates should have an appropriate education, together with ten to fifteen years of Data Processing experience. Good interpersonal skills and decision making abilities essential.

Qualified applicants should send resume and salary history in confidence to: **CW Box 2075, 797 Washington St., Newton, MA 02160**

an equal opportunity employer

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# ATTENTION:

## PROGRAMMERS, SYSTEMS ANALYSTS OTHER EDP PROFESSIONALS

Wakefern Food Corp., the nation's largest food cooperative is presently under going unparalleled growth which includes a broad expansion of its computer information services division. The recently completed conversions to IBM 3031's as well as the designing and development of various on-line applications and our heavy involvement in CICS is an indication of Wakefern's technical growth and needs.

If you have experience as any one of the following:

**Systems Programmers • Applications Programmers • Systems Analysts • On-line Systems Development • Distributive Processing • Point-Of-Sale**

Wakefern offers an outstanding compensation package including top competitive salaries and an unusually broad benefits plan that includes tuition, eye care, dental and much, much more. For immediate consideration call or write Mark Atherton.

**WAKEFERN FOOD CORP.**
342 Westminster Avenue
Elizabeth, N.J. 07207
201-527-3805
*An equal opportunity employer M/F*

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## CALIFORNIA

If you are interested in exploring CALIFORNIA Employment Opportunities, call the West Coast's largest organization devoted exclusively to employment services for the Computer Professional

Our staff is largely composed of former DP Managers, Software Specialists, and Computer Executives who are well-equipped to understand your special needs.

**You may call us collect.**

**DESIGNER to $38K**
Help design and implement the "Office of the Future." If you have a desire to use PASCAL, a degree in CS, and enjoy O/S, Compilers, or R/T applications, call.
Ask for Software Division.

**SYSTEMS ANALYST to $32K**
Oversee and participate in the implementation of Materiel and Requirements Planning packages in an IMS environment. Requires 2–5 years manufacturing design or programming experience. Knowledge of Data Base helpful. Interview and relocation expenses paid.
Ask for Large Systems.

**PROG/ANALYST to $24K**
Join the exciting world of Turnkey Business Systems. Responsibilities include customer interface, design/analysis, and programming on Data General minicomputers. Requires minimum 1 year financial applications in any programming language, BASIC an asset.
Ask for Business Systems.

COMPUTER CAREERS
INC., AGENCY
280 Atlantic Avenue
Long Beach, CA 90802
(213) 437-2881

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# COMPUTER PROFESSIONALS

Several of the nation's top corporations are expanding their professional data processing staffs. Work centers primarily on new development or major enhancement to commercially oriented systems, many involving data base and data communications technology. Applications include insurance, banking, finance, manufacturing, transportation, utilities and oil and gas. Staff members are chosen for their creativity and innovative spirit, as well as their technical and professional skills. Our client companies are searching for programmer/analysts, project leaders, consultants, and managers with experience in these areas:

- **IMS DESIGN**
- **IMS/MFG/FINANCE**
- **UNIVAC 1100 COBOL**
- **ALC, INSURANCE**
- **OS, COBOL, BAL, OR PL/1**
- **HONEYWELL**
- **MARK IV**
- **CICS**
- **INTERCOMM**
- **TOTAL**
- **SYSTEM INTERNALS**
- **MINI COMPUTERS**

Positions are available in Seattle, Portland, Anchorage, Dallas, Fort Worth, Houston, San Antonio, San Francisco and Los Angeles. If you are a bright, aggressive individual with at least one year experience, we want to hear from you. Investigate the opportunities available; the confidentiality of your inquiry is assured. Telephone Lois Flury at 206/385-0387; or mail your resume today. And if you're interested, but too busy to send a resume, complete the following form:

NAME ____________________
ADDRESS ____________________
CITY ____________ STATE ________ ZIP ________
HOME PHONE ( ) ________ WORK PHONE ( ) ________
HARDWARE EXPERIENCE ____________________
LANGUAGE EXPERIENCE ____________________
OPERATING SYSTEMS ____________________
APPLICATIONS ____________________
PRESENT SALARY ________ GEOG. PREF. ________

Please send resume to:

**Flury & Associates**
**Post Office Box 1180**
**Port Townsend, Washington 98368**
**Or phone (206) 385-0387**

Client Companies Assume Our Fees
equal opportunity employer m/f/h

# SOFTWARE SYSTEMS ANALYST

The Williams Companies has an immediate opening in their expanding information staff for a Software Systems Analyst. Responsibilities will include: installation, maintenance, monitoring, training and documentation for CICS and IMS systems.

The company facility is one of the finest in the Southwest. We are running MVS/SE 3.7 with JES2. In addition to IMS and CICS, we use TSO and Cobol with applications primarily being business related.

The compensation package is attractive, but most importantly, is the opportunity to grow with a dedicated team of professionals in a state-of-the-art environment.

Qualified individuals are invited to submit their resume and salary history in complete confidence to:

**THE WILLIAMS COMPANIES**
**Department 198**
**P.O. Box 2400**
**One Williams Center**
**Tulsa, Oklahoma 74101**
*An Equal Opportunity Employer*

***THE WILLIAMS COMPANIES***

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## SYSTEMS ANALYST

**DIVERSE, CHALLENGING AND REWARDING...**

are the responsibilities of the systems analyst at Lutheran General Hospital, located in the Chicago suburb of Park Ridge.

Varied duties include developing design specifications, supervising program development and interaction with various client departments.

The ideal candidate will have 3 years data processing experience, at least 1 year of which should be in an analyst capacity. Good communication and Interpersonal skills are essential. Interest or knowledge in minicomputers and health care environment is a definite asset.

As one of Chicago's largest and most progressive hospitals we offer you an excellent salary, liberal benefit package and a convenient and pleasant suburban location. For immediate confidential consideration, send your resume to:

**Diane C. Lavine**
**Director of Employment**

LUTHERAN
GENERAL
HOSPITAL

Lutheran General Hospital
1775 Dempster Street
Park Ridge, Illinois 60068
**Equal Opportunity Employer M/F**

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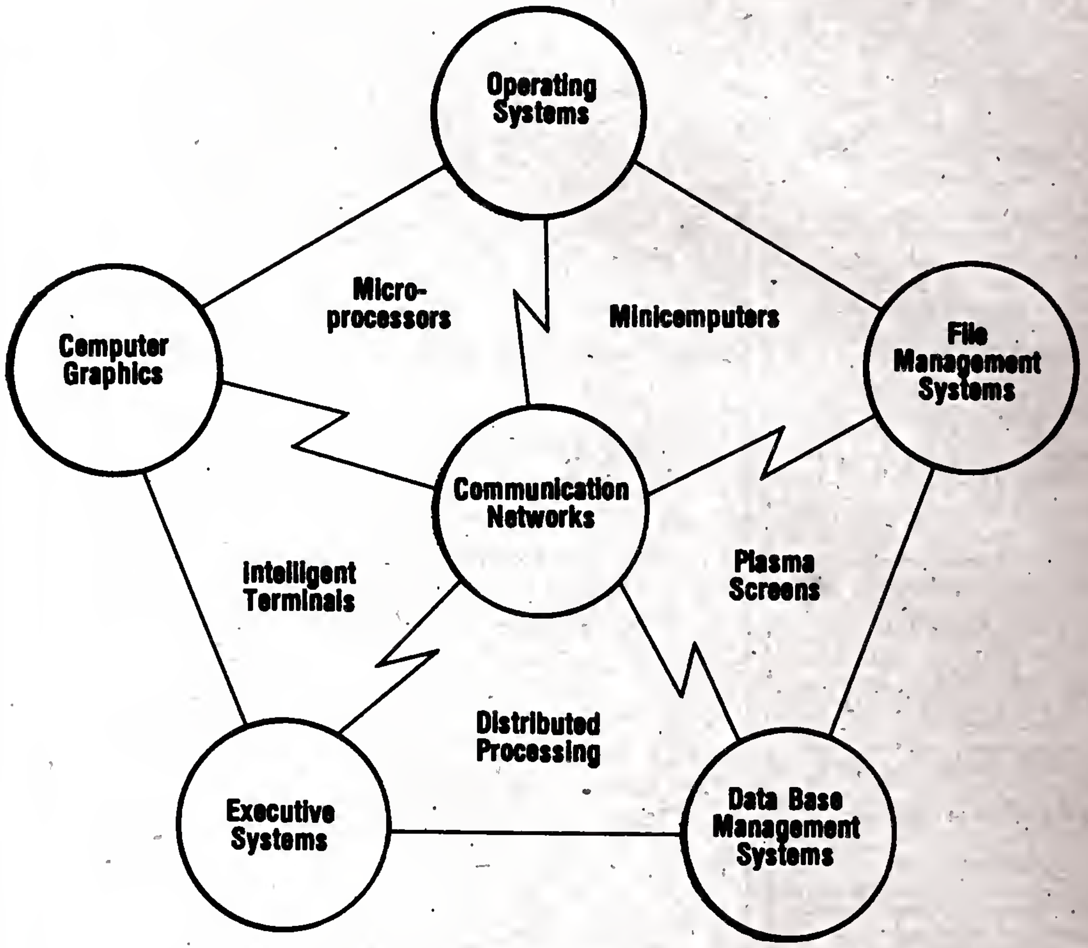
# PROGRAMMING PROFESSIONALS:



CALCULON has been successfully serving industry and government since 1957. We are growing rapidly—our staff increased by more than 25% last year, to nearly 500 employees. More important, we offer an unparalleled level of technical exposure and participation. **If your skills are in any of the above areas, and you have experience in PL-1, FORTRAN, BASIC, or ASSEMBLY languages, we'd like to meet with you to tell you about our management-owned company, and its work.**

You will support the implementation of a multi-user interactive data management system employing intelligent terminals, with hands-on participation in the development of operating systems, file management systems, and data base management systems. Our systems include distributed processing with three different computers, and communications command and control applications involving nodal networks. There are extensive software development support facilities utilizing five computer types.

If you are qualified...interested in challenging and meaningful work...and want the opportunity to grow both personally and professionally, we invite your response. Please send your resume, in confidence, to: **Fred Aaron, Dept. T, CALCULON Corporation, 1501 Wilson Blvd., Arlington, Va. 22209.** An equal opportunity employer.

**CALCULON**

Formerly AUERBACH Associates

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# MANUFACTURING ANALYSTS AND PROGRAMMERS

We are the inventor and leading manufacturer of submergible pumps used in oil and water well systems, interested in offering you an opportunity to join a progressive MIS staff.

## APPLICATIONS SPECIALIST

Minimum of three years experience in manufacturing systems including two years' applications programming and one year systems design. Responsibilities will encompass planning, coordinating and controlling manufacturing projects for local and distributed systems.

## IBM 370 — APPLICATIONS PROGRAMMER

One to two years' programming experience with DOS/VS, CICS, and manufacturing applications in COBOL.

## SINGER SYSTEM TEN PROGRAMMER

One to two years' experience manufacturing applications on Singer System ten with 44-1 disk and JIS terminals. Familiarity with IBM 370 a real plus.

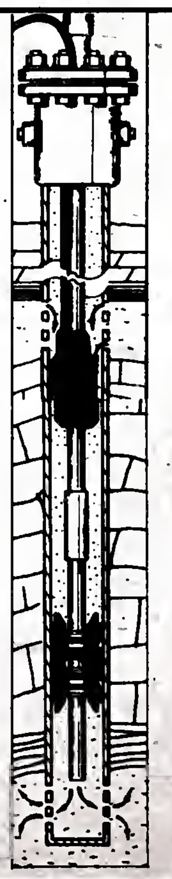
You will join a staff of professionals committed to distributed data processing, data base implementation and developing a first class Manufacturing Resource Planning System which will help us to maintain our position as an industry leader.

We are a major operating unit of a Fortune 75 Company, offering an excellent compensation package.

*Please send your resume and salary history in confidence to:*

**TRW**

***REDA PUMP***
*A DIVISION OF TRW INC.*
*P.O. Box 1181, Bartlesville, Oklahoma 74003*
*an equal opportunity employer male/female*



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## UNIVERSITY OF IOWA

The Weeg Computing Center provides computing services for the University's academic community. The Center operates an IBM 370/166 under VM/CMS, four Prime 750s linked via Primenet, several Hewlett-Packard 2000 systems, and a Control Data Cyber 70/71. We have openings for the following positions in this dynamic, stimulating environment:

### Senior Systems Analyst

To lead the group responsible for assisting users with their data management efforts, from data entry through final analysis. Programming experience is required. Data base management and supervisory experience are desirable. Salary range is $16,750 to $26,460 depending upon qualifications.

### Systems Analyst

To supervise a programmer analyst and several part-time programmers in the Custom Programming Group. This group produces custom-tailored software primarily for campus users. Programming experience is required, and supervisory experience is desirable. Salary range is $15,570 to $24,630 depending upon qualifications.

### Programmer Analyst

To be responsible for designing and writing new programs and modifying existing programs for the IBM and Prime systems. Initially responsibilities will include conversion of user programs from the CDC Cyber to the Primes or IBM. Programming experience is required; experience in a similar environment is preferred. The salary range is $12,520 to $19,660 depending upon qualifications.

Applicant screening will begin October 1. Send resume, salary history, and position desired to:

Linda Boyetzies
**Weeg Computing Center**
**University of Iowa**
Iowa City, Iowa 52242
*The University of Iowa is an equal opportunity/affirmative action employer.*

# Vice President
## Manufacturing Operations

Rapidly expanding, high volume technology firm located on the SAN FRANCISCO PENINSULA seeks an exceptional individual to direct manufacturing operations at its U.S. and off-shore locations. Substantial profitable line management experience in the computer industry essential. Technical degree(s) required; MBA an asset.

Your background must encompass a record of attracting and retaining successful people, a strong commitment to quality products, automation knowledge, experience with EDP manufacturing systems and line management experience in a $100-500 million company. Base salary is expected to be in the $55-$65K range with total remuneration including incentive bonus in excess of $80K. Attractive stock option plan. Individual selected will be a member of the Executive Management Committee.

For immediate consideration, please send, in confidence, a chronological resume with compensation history and a covering letter stating specifically why you should be selected for this position, to
CW Box 2043, 797 Washington St., Newton, MA 02160

*Equal opportunity employer*

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# SENIOR EDP AUDITOR
## (MANCHESTER LOCATION)

American International Group — a trend setter in the insurance industry — is currently looking for a dynamic take charge Senior EDP Auditor for our Manchester, N.H. office.

This individual will bring to the job at least 2 years of auditing and 3 years EDP experience including a knowledge of COBOL and OS/JCL. Mark IV, S/2170 and insurance experience are a plus.

We offer an excellent earning opportunity, a fine benefits package and a definite opportunity for growth. Relocation will be considered. Please CALL COLLECT or send your resume to:

**Carrie Landau**
**(212) 770-7886**
70 Pine Street
New York, N.Y. 10005

Equal Opportunity Employer, M/F/V/H

**American International Group**

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# Software Engineers

## Designing tomorrow's total military systems means staying a step ahead of today's technology—that's the challenge at Norden Systems.

We've succeeded in becoming one of the nation's leading suppliers of complete military electronic systems by applying tomorrow's technology today. If you're the kind of software engineer who desires an opportunity for career growth commensurate with your contributions, there's a place for you in our Systems Group.

As a member of the Group, you'll help determine customer needs, then design and follow through on implementation of integrated command, control and communications systems, or real time signal processing applications.

Your contributions toward our continued success and growth will be rewarded with opportunities for your continued personal growth. You will remain up-front professionally, with plenty of room to advance with this subsidiary of United Technologies.

### Real Time Software Engineers

Requires a background in Assembly language programming on at least two computers, preferably minicomputers or microcomputers, and real-time applications such as signal processing, process control, ballistics, manned aircraft guidance, missile guidance, or remotely piloted vehicle control.

### Command, Control, Communications Systems Software Engineers

Requires a background in command, control and communications systems . . . and Assembly, CMS-2, JOVIAL, or FORTRAN languages. Experience in distributed processing, communications, graphic and alphanumeric display design, real-time operating systems, data base management systems, data base design, remote data base maintenance and update, startover and switchover systems helpful.

### Associate Software Engineers

Requires a degree in Mathematics, Physics, Computer Sciences or Engineering and two years programming experience preferably using Assembly, CMS-2 or JOVIAL languages.

**Call Collect for appointment**
**William McGuire (203) 852-4736**

If not convenient to call, send resume to Mr. McGuire,
Norden Systems, Inc., 303 Norden Place,
Norwalk, Connecticut 06856.

**NORDEN SYSTEMS** Subsidiary of UNITED TECHNOLOGIES

**An Equal Opportunity Employer**

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# PROGRAMMER ANALYSTS
# ARE YOU READY FOR 3032?

As an internationally recognized leader in the manufacturing and marketing of quality Personal Products, we are International Playtex, Inc., continually update our EDP operations to maintain ourselves at the leading edge of the state of the art. Today, that means MVS, IMS, TSO, and Data Base/Data Communications in a 3032 environment.

At present we have several key openings in our Information Systems Group for Programmer Analysts with a strong background in Cobol and familiarity with IBM 370 series applications.

## SYSTEMS ANALYSIS

For these tasks you will need experience in designing/implementing various applications — especially Marketing, Sales, and/or Distribution.

## DATA BASE DESIGN/IMPLEMENTATION

Be involved in developing entirely new IBM 3032 applications. The key requirement is a background in IMS (DMS considered.) a Bachelor's Degree will be helpful.

Our location in central Delaware is pleasant and desirable, offering good living conditions with ready access to a number of major metro centers and a wide variety of recreational areas.

We offer an attractive starting salary and excellent fringe benefits that include relocation assistance, tuition reimbursement, and a dental plan.

**To arrange a personal interview, please call Manager, Personnel Administration, P.Y. Peterson, COLLECT at (302) 674-6133, or mail your resume to:**

IPI

**International Playtex, Inc.**
**Box 631, Dover, Delaware 19901**
An Equal Opportunity Employer M/F

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**Software Professionals**

# EMPLOYEES WORK. PROFESSIONALS CONSULT . . .
## At Up To $900/Week!

And you can be one of the experts our top-drawer clients consult, with a broad range of EDP challenges that require your talents. Your 2 years or more of experience in programming, systems, or related software disciplines are the key. We'll show you the door — at any of these regional offices.

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Pat Kelly
591 North Avenue
Wakefield, MA 01880
(617) 245-6596

ATLANTA:
Van Frier
340 Interstate North
Atlanta, GA 30339
(404) 953-1220

WASHINGTON/BALTIMORE:
Bob Slade
9811 Mallard Drive
Laurel, MD 20811
(301) 953-1217

DALLAS:
Phil Weatherford
800 W. Airport Freeway
Irving, TX 75062
(214) 251-1611

Σ SIGMATICS

DATA PROCESSING

# PROJECT MANAGER

## Retail-Revolving Credit

Our highly successful $4 billion dollar asset corporation, located in beautiful and historic Morris County, New Jersey, is seeking a senior level project manager to add to the staff of its expanding data processing subsidiary. Individual hired will have primary responsibility for system design of an expanded version of our existing revolving credit program. This is a highly visible management position offering definite growth opportunity.

### QUALIFICATIONS SHOULD INCLUDE:

- Previous experience in designing a centralized revolving credit processing system.
- Heavy DP experience including knowledge of real time operating systems and data base management software.
- Strong knowledge of the retail credit, receivables business. Experience through private label credit card systems a plus.

Our present IBM equipment consists of a 370-158 and a 3033. Competitive salary and comprehensive benefits package are offered.

**Please submit resume including salary history, to:**
**Box 0938PM, Suite 1100**
**551 Fifth Ave, New York, NY 10017**
*An equal opportunity employer m/f*

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EASTERN

# PROGRAMMERS

Eastern Airlines has openings at its Miami passenger reservations computer center for programmers with the following qualifications:

- **ACP/PABS experience**
- **IBM 360/370 BAL**

We also have openings at our commercial computer center for programmers with experience in:

- **UNIVAC 1100/80 equipment**
- **DMS/DML/CMS/TIP software**
- **COBAL**

Eastern offers a competitive salary up to $24,900 depending upon experience level, an attractive benefit package including worldwide travel discounts and relocation expenses. Send detailed resume including salary history to:

**Eastern Airlines**
**Management Recruiting**
**Department "L"**
**Miami, FLA 33148**
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# PROGRAMMERS

## SALARY TO $27,000 IN NEW ORLEANS

We are a recognized national authority in the fields of computer facilities management and EDP consulting for local government. For the City of New Orleans, we manage applications development.

We are seeking a highly skilled COBOL programmer to work in a multiple IBM CPU environment. Initial responsibility will focus on development of complex programs, training junior staff members and system technical design. Future opportunities are unlimited for advancement oriented individuals.

The position requires 3 years' OS/VS COBOL and a working knowledge of VSAM. Command level CICS is desirable. The applicant should be able to demonstrate a proven record of achievement.

Exceptional fringe benefit package offers 3 weeks vacation, paid relocation, paid life, health and dental insurance, stock participation. Growth opportunities are also exceptional and include:

- Individualized training program to keep your skills current.
- State of the art data processing shop. Multiple IBM CPU's, OS/VS1, VSAM, ROSCOE, CICS, EASYTRIEVE, structured COBOL.
- Exclusively new system development.

**For prompt consideration call Ian Strachan collect at (504) 586-4964 or send your resume in strict confidence to P.O. Box 53322, New Orleans, LA 70153.**

*An Equal Opportunity Employer M/F*

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# CRAY RESEARCH

## Builds For The Future

CRAY RESEARCH is the leader in the large scale scientific computer business. We are a rapidly growing company with a variety of diverse, interesting positions in a small company atmosphere.

### FORTRAN COMPILER DEVELOPMENT

We currently have an opening for a person with experience in FORTRAN Compiler Development. This position involves designing and implementing extensions to our FORTRAN Compiler and working on optimization and code generation. This requires a degree in Math, Physics, Computer Science or equivalent plus at least 5 years experience in Compiler Development. This position is located in our Mendota Heights, MN. facility a suburb of St. Paul/Minneapolis, MN.

### OPERATING SYSTEM DEVELOPMENT

We currently have several openings in our System Group for people interested in Operating System Development for large scale scientific computers. These openings are in areas such as: I/O subsystems, File Management, and instruction simulator development. A degree in Math, Physics or Computer Science in prefered. There are openings for all levels of eperience. These positions are located in our Mendota Heights, MN. facility.

### INSTRUCTOR
### (Computer Hardware)

This person will be instrumental in all phases of developing courses for customers and employees. The instructor's primary duties are to design and implement hardware training courses for classroom instruction.

The applicant should have a minimum of 2 years teaching experience and 2 years maintenance experience on large scale computer systems. Writing exposure is plus. Location is Chippewa Falls, one of Wisconsin's most attracitve and scenic recreational areas.

### CUSTOMER ENGINEER

Openings exist for talented computer professionals for challenging assignments at several of our sites. Requires one year of experience on large scale computer system. After extensive on-the-job training on the Super Scale Cray-I, the successful candidates will be assigned to customer sites.

In addition to a highly competitive compensation and benefits package, you wil be joining a highly successful and growing organization. Please submit your resume and salary history in confidence to:

**C.W, Kennedy**
**CRAY RESEARCH INC.**
**1440 Northland Drive**
**Mendota Heights, MN 55120**
*An Equal Opportunity Employer M/F*

CRAY
RESEARCH, INC.

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PHILADELPHIA

# CONSULTANTS
## TO $35,000

We have been retained by a well known So East PA firm to recruit DP PROFESSIONALS who are CAREER ORIENTED & wish to establish themselves with a FAST—MOVING INDUSTRY LEADER.

Our client seeks PROGRAMMER/ANALYSTS at various levels w/3-5 yrs well-rounded DP exp. Must be self-motivated, shirtsleeve type w/an ability to communicate with users & mgmt.

Here is your chance to work w/STATE-OF-THE-ART TECHNOLOGY & ADVANCE RAPIDLY TO MANAGEMENT. If you meet the above qualifications and have experience in one or more of the following areas, contact us immediately:

**LGE SCALE IBM, COBOL, OS**
unlimited growth potential

**BURROUGHS, DMS II**
long term project

**HONEYWELL, COBOL, IDS II**
ideal location

**PL1, ANY EQUIPMENT**
excellent fringes

**IDMS &/OR CICS**
upward mobility

**For full details of any of our FEE PAID positions, please call for immediate interview appointment or forward resume to our Recruitment Specialist**

**ROBERT HALF**
**OF PHILADELPHIA, INC.**
**2000 Market St., Suite 706**
**Philadelphia, PA 19103**
**(215) 568-4580**

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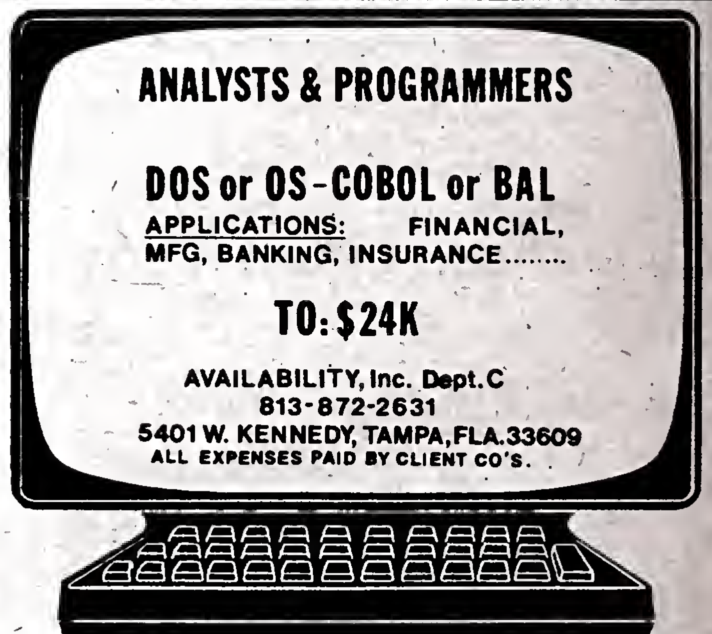

## ANALYSTS & PROGRAMMERS

## DOS or OS-COBOL or BAL

**APPLICATIONS: FINANCIAL, MFG, BANKING, INSURANCE........**

## TO: $24K

**AVAILABILITY, Inc. Dept.C**
**813-872-2631**
**5401 W. KENNEDY, TAMPA, FLA.33609**
**ALL EXPENSES PAID BY CLIENT CO'S.**

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# COMPUTER PROFESSIONAL

**Bored or Rushed? A fine line.**

Unfortunately in today's world one's professional job has a tendency to go from one extreme to the other. Our goal is to find that happy middle ground for you and the companies we represent. To do this there needs to be a "total" relationship in the computing environment.

Sample Listing Of Jobs Nation-Wide

**Systems Programming/Real Time . . . . . . . . . $12,000 TO $35,000**
370/303X/DEC/HP/Univac/Honeywell etc. — Some are with Fortune 100 corporations, computer service, vendors, etc.
**Project Managers — All Industries. . . . . . . . . $18,000 TO $37,000**
Large/small companies — Distribution, manufacturers, retail, banking, software product development, CPA firms, etc.
**Staff Engineering — EE's, ME's . . . . . . . . . . . $15,000 TO $35,000**
Positions from TTL, VMOS, HMOS design to new facility management opportunities.
**Sales/Marketing/Product Strategy. . . . . . . . . . . Pkgs TO $80,000**
**Applications Development/National . . . . . . . $12,000 TO $30,000**
Relocation paid in most instances for COBOL, ALC (BAL), APL, PASCAL, IMS, TOTAL, RPGII, MOBOL, and other languages analyst programmers.

We will talk to you candidly about the current job market and help you to find that position that both fits your talents and desires.

Remember your career is serious business to us. Timing is the key element to finding the proper position and we work day in/day out looking at jobs with you in mind.

**CALL OR WRITE BILL COLLEN (512) 349-3666**

**Suite 305 GPM TOWER**
**800 NW Loop 410**
**San Antonio, TX 78216**
**Company Fee Paid**

**ComputeR career Resources**

*Ten years of career specializing — Seven years of computing experience*
*Independent Associates Nationwide*

**Reynolds Electrical & Engineering Co., Inc. has immediate job opportunities available in Las Vegas, Nevada.**

## PROGRAMMER

Opportunities exist for individuals with experience on large-scale computers in a timesharing environment. We are looking for talented individuals with at least two years of applicable computer programming experience plus a degree in business administration, mathematics, accounting or computer sciences.

Must be a U.S. citizen.
Replies held confidential.
Liberal fringe benefits.

*EQUAL OPPORTUNITY EMPLOYER — M/F*

Send resumes to:

**Ms. Trudie L. Rainey, M/S 567**
**Post Office Box 14400**
**Las Vegas, NV 89114**
**Tel: 702-734-3291**

**REECo**
**Reynolds Electrical & Engineering Co., Inc.**

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## CAN YOU TEACH?

**If so, an outstanding professional position is open to you.**

**INQUIRE, a user-oriented state-of-the-art database management system, is installed at major corporations and government agencies in the United States, Canada and Europe. We need another INQUIRE instructor to meet the growth in our INQUIRE user community.**

**We need you if you have:**

**One or more years of teaching experience, two to four years of data processing experience on large scale IBM systems and, above all, the ability to communicate DBMS concepts.**

**Travel is a part of the job an a degree is desirable.**

**If you meet our requirements, give Rich Stevenson a call at (703) 578-3430.**

**We are:**
Infodata Systems Inc.
5205 Leesburg Pike
Falls Church, VA 22041

***Equal Opportunity/Affirmative Action Employer M/F***

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# BUSINESS PROGRAMMERS

Harris Corporation Government Systems Group Operations has openings for business application programmers in Palm Bay, Florida. Candidates should have 1–3 years experience and be proficient with COBOL and IBM Job Control Language (JCL). Opportunities exist to support Personnel, Materials, and Accounting functions. Experience in DB/DC applications is desirable, particularly with the IDMS/SHADOW packages. Our hardware is IBM and IBM compatible. A Computer Science, Math or Equivalent BS degree is desired.

If you're looking for a professional environment that encourages contribution, excellent pay and benefits, and a beautiful, affordable lifestyle on the sunny Florida shoreline, come to Harris.

Send resume with salary history to: Mr. R.B. Jones, Manager Professional Staffing, Harris Government Systems Group, P.O. Box 37 CW, Melbourne, Florida 32901.

## Harris in Florida, the good life.

**HARRIS**
COMMUNICATION AND INFORMATION PROCESSING

An Equal Opportunity Employer M/F.

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SOFTWARE PROFESSIONALS

# A chance to join NCR's newest software group...

## and be at NCR's headquarters for Transaction Processing Systems development.

Our Systems Engineering Group in Dayton designs and develops transaction processing software for NCR's general purpose computer systems. During the past 4 months this group has *tripled* in size to meet demand for our software product line.

*Here are 2 opportunities to be part of this phenomenal growth:*

### Product Support

As a member of the Systems Engineering Product Support team, you'll assist customers installing transaction processing systems, do on-site planning of overall systems, conduct demonstrations and customer training classes, as well as some isolation and field follow-up. Requirements: degree, 2-5 years online experience in data base transaction processing or applications, strong interpersonal and presentation abilities, and willingness to undertake 10-15% travel.

### Software Configuration Management

By overseeing a software product through all phases of the development cycle—from design phase through release—you will not only acquire an in-depth product knowledge, but will be influencing overall direction of new products under development. You'll be designing and executing test for final validation of new transaction processing systems, monitoring development process, and conducting standards reviews through the development cycle, and defining and documenting standards and procedures. Requirements: degree in CS/math and 2-5 solid years in software development. Exposure to test methodologies and project management desirable.

**Salaries are fully commensurate; comprehensive benefits include relocation; and our location offers choice of urban/suburban living, affordable housing, and fine educational and cultural attractions. Please send resume and salary history to or call COLLECT (513) 449-2670: Ms. Joan Rourke, NCR Corporation, Systems Engineering, Dept. F50, Building 30, Main & Caldwell Streets, Dayton, Ohio 45479.**

**NCR**
Complete Computer Systems

An equal opportunity employer

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### TECHNICAL WRITERS AND INSTRUCTORS TO $27K

Several clients throughout the country have asked us to find them qualified Technical Writers.

*Partial Listing:*

**HARDWARE WRITERS** — senior levels (to $28K), mid & junior levels. Good digital experience in maintenance or repair may qualify you for junior spots.

**SOFTWARE WRITERS** — for operation & user apps. Strong bkgd. in programming or systems analysis may qualify you.

**MANAGEMENT** — Large corp. has several openings in Northeast.

**TECHNICAL INSTRUCTORS** — Software & Hardware positions available at all levels.

*Contact Jack Gilbert at*

**JUDGE ELECTRONICS, INC.**
Ste. 100, 2 Newton Exec. Pk.
Newton Lower Falls, MA 02162
**617-965-9700**

*Executive Search and Placement*

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## SAN FRANCISCO BAY AREA

Applicants who visited our city last month, are now employed by our clients, with relocation expenses paid.

- **AUDITORS - Data Processing.** Travel to Europe and Far East
- **COBOL Programmers.** Local demand exceeds supply. From mini's to IBM 3000 series. On-line, data base management.
- **DATA BASE ADMINISTRATION** Data Base Design. IBM 370/IMS
- **SYSTEMS PROGRAMMER** Both IBM 370/OS/VS and DOS/VS.
- **RPG II PROGRAMMER/MANAGER** Systems 3, 32, 34.
- **SR. ANALYST MOG. APPLICATIONS** Management potential. European relocation.

Other positions available in: Operations, Systems Engineering, Management.

Send resume or call:

ROBERT HALF OF NORTHERN CALIFORNIA
EDP SEARCH SPECIALISTS

**Jerry Anderson or**
**Bob Couch**
**(415) 434-1900**
**111 Pine Street**
**San Francisco, CA 94111**

**Rich Abreau**
**(415) 493-8700**
**2 Palo Alto Sq. #920**
**Palo Alto, CA 94304**

*OUR CLIENTS PAY ALL FEES.*

## BANKING PROGRAMMERS & ANALYSTS

Come join the oldest and largest Savings and Loan Association in New Mexico. We are growing and expanding at an unparalleled rate. The company offers competitive salaries and excellent benefits including dental coverage.

Our Information Services department is housed in its own building with lounge facilities. On-line real time applications include Savings, Mortgage Loan and Consumer Loan. Other applications are Construction Loan, General Ledger, Payroll, Safe Deposit Box, Land Development and Statesman's Club. We have fourteen major projects scheduled in 1979 and several planned for 1980.

All our Systems and Programming personnel are involved in new project work. No one has only maintenance programming responsibilities. Every individual is scheduled for outside technical education each year.

Successful candidates should have at least two years bank application experience in a COBOL environment. Honeywell knowledge preferred but not necessary.

To take advantage of these ground floor opportunities forward your resume to the address below. It must include a brief description of your involvement in banking applications, salary history, salary expectations and a phone number.

**Mr. John W. Benedict**
**Manager Systems & Programming**
**Albuquerque Federal Savings & Loan**
**P.O. Box 25000**
**Albuquerque, New Mexico 87125**
**An Equal Opportunity Employer**

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## Systems Analysts/Programmers

Our Enid, Oklahoma, Information Services Department has several openings for Systems Analysts/Programmers.

Successful candidates will have a minimum of 3-4 years of combined experience in systems analysis and programming of business and commercial applications. A bachelor's degree in accounting or business or equivalent is required. IBM equipment and COBOL experience is a "must" for these positions.

**CHAMPLIN PETROLEUM COMPANY**
offers: excellent salaries, an outstanding benefit package and strong personal growth potential. Send resume, including salary requirements, in strict confidence to: Manager, Employee Relations & Administrative Services.

**CHAMPLIN PETROLEUM COMPANY**
**P.O. Box 552, Enid, OK 73701**

champlin

An Equal Opportunity Employer, M/F

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### DEADLINE EXTENDED
## DEAN OF BUSINESS SERVICES
at
## Yavapai College
## Prescott, Arizona

Yavapai College is a fully-accredited, comprehensive community college serving some 5000 students in Northern Arizona. The main campus is located at Prescott, 100 miles north of Phoenix, adjoining the Prescott National Forest.

**ESSENTIAL QUALIFICATIONS:**
Bachelor's Degree in Business and/or Personnel Administration or related areas; at least two years of related experience. Must be proficient in planning, budget development, budget control, and salary administration. Must have experience in supervision of a fiscal operation.

**DESIRABLE QUALIFICATIONS:**
Master's or Doctor's Degree. Knowledge of MBO, ZBB, and data processing. Experience in Community College administration. Certified as a CPA.

**SALARY:**
$28,000 — $33,000 depending on qualifications.

**RESPONSIBILITIES:**
Fiscal management, planning, budget development, salary administration, purchasing, auxiliary enterprises, data processing, classified and support personnel, inventory control and maintenance of physical plant.

**STARTING DATE:**
November 1, 1979, or as soon as possible

**APPLICATIONS:**
Letter of application, resume, three letters of professional recommendation, and names and telephone numbers of five professional references should be addressed to:

**Dr. David Hochstettler, Chairman**
**Dean of Business Services Screening Committee**
**Yavapai College**
**1100 East Sheldon Street, Prescott, Arizona 86301**
**(602) 445-7300**

**CLOSING DATE:**
September 30,1979

**An Equal Opportunity, Affirmative Action, Title IX Employer**

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## DATA COMMUNICATIONS PROGRAMMER

Explore the bright career opportunities in Southern California at CONTROL DATA CORPORATION - a world leader in computer technology, education and financial services.

At our COMMUNICATIONS SYSTEMS DIVISION, you can enjoy the benefits of a super computer company while working in a small group environment. This operation, which employs more than 400 people, has recently moved to a new location situated near ample housing and diverse recreational facilities.

Professional openings exist in the areas of data communications network, message switching and front-end systems. Experienced candidates should be familiar in any of the following:

- **ASSEMBLY/PASCAL/ ALGOL LANGUAGES**
- **MICROPROCESSORS**
- **REAL TIME SYSTEMS**
- **COMMUNICATIONS PROTOCOLS**
- **TEST PROCEDURE DEVELOPMENT**
- **TEST TOOL DEVELOPMENT**

Qualified individuals wishing to discuss opportunities in state-of-the-art communications systems are encouraged to apply. We offer an attractive starting salary as well as a liberal fringe benefits package which includes relocation, flexible hours, medical, dental and educational programs.

Send resume with salary history to:

**JESS HOLGUIN**

CONTROL DATA
CORPORATION
**Communications Systems Division**
**3285 E. Carpenter Avenue**
**P.O. Box 4380-P**
**Anaheim, California 92803**
**(714) 630-2022, ext. 2017**

An Affirmative Action Employer M/F

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**COMPUTER CAPITAL**
**Balto/Wash**
Programmer/Analyst

Assist in development of large network consisting of minis & terminals. Exc. Fringe include - education assistance & mortgage credit. Rel. & Fee Paid.

3-5 yrs. COBOL OS JCL
6 mos. analytical req'd

**ROBERT HALF**

**Robert Half of Baltimore**
217 The Quad., Balt., Md. 21210
(301) 323-7770
**Robert Half of Washington**
7316 Wisc. Ave., Wash DC 20014
(301) 652-1960

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### PROGRAMMER/ANALYST

Lehigh Valley, Pa., area manufacturer is seeking an individual with 4-5 years RPG II programming experience. Exposure to financial applications such as A/P, G.L., financial statements, etc., a plus.

Excellent salary and benefits included.

Equal Opportunity Employer. Send resume, including salary history and requirements to:

**P/A, P.O. Box 2028**
**Lehigh Valley, PA 18001**

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## SPRINGFIELD, IL PROGRAMMERS WANTED

Programmer III -
Salary Range $1294 - $1906

Programmer IV -
Salary Range $1452 - $2160

TSO, IMS, OS/VSI
Requirements

Contact: Edith Bowsher
**Illinois Dept. of**
**Children & Family Services**
**217/785-0590**

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We are a large midtown Fortune 500 corporation utilizing state-of-the-art hardware and software. Our hardware is large scale IBM equipment supporting a 200 terminal CICS telecommunications network, with inventory control, distribution and merchandising the primary applications. Our applications are primarily COBOL with some BAL. We use VSAM and interactive programming terminals. Due to future planned expansion, we have the following immediate openings available:

## MIS DEVELOPMENT MANAGER

Ambitious self-starter with minimum of 5 years proven expertise in effective management of large scale systems and programming projects, from project design through implementation using structured programming techniques. Absolute mastery of COBOL, BAL and CICS mandatory. Must be able to deal effectively with management and possess superior communicative skills. College degree in Business or Computer Sciences desired.

## MIS PRODUCTION MANAGER

Must be aggressive, dynamic individual capable of managing a staff of 15, operating three shifts. Areas of responsibility include computer operations, production programming, production control and data entry. Must have experience with telecommunications, CICS networks, OS/MVS, JCL, procs, scheduling and hardware evaluations.

We offer a salary fully commensurate with your background and comprehensive fringe benefits. Send detailed resume with salary history and requirements, in strict confidence, to: **Box 0940 MI, Suite 1100, 551 5th Avenue, New York, NY 10017.**

*An equal opportunity employer m/f*

## CHOOSE YOUR LOCATION!

Career opportunities available for qualified EDP Professionals with client companies in the following areas:

**PARTIAL LIST ONLY**

***Atlanta**
***Houston**
***San Francisco**
***Ft. Lauderdale**
***Orlando**
***Charlotte**
***Portland**
***Dallas**
***Denver**
***Phoenix**
***New Orleans**
***Tampa**
***Long Beach**
***Miami**

Companies provide challenge, opportunity for advancement, and "State-of-the-Art" motivations:

Need the following specialities: (Minimum of 1 year experience in IBM environment)

Programmer(s), Programmer/Analyst(s), Systems Analyst(s), Project Leader(s), Systems Programmer(s), Communications Programmer(s).

All fees, including interviewing and relocation expenses assumed by client companies.

**Please send your resume in CONFIDENCE OR CALL ME TOLL FREE 1-800 821-2280 X804 (In MO, 1-800 892-7655 X804)**

Bill Denny/Jim King

**Jim King and Associates**

438 Gulf Life Tower/Jacksonville, Florida 32207
(904) 398-7371

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## PROGRAMMER ANALYST/SYSTEMS ANALYST
## UNIVERSITY OF NORTHERN IOWA

UNI is currently a pioneer in the implementation of Cincom's TIS software. We are looking for an individual to take over several application areas and participate in the movement to an on-line directory driven data base environment. Exposure to this new software represents a tremendous opportunity for qualified candidates. Minimum requirement of B.A. plus 2-4 years of solid IBM OS and COBOL experience. Experience will be substituted for education requirements. Salary range $13,250 to $20,250 depending on qualifications and skills. **Call directly to Dwight Berryman (319-273-2044), Director of Administrative Data Processing, or write Raymond Harris, Personnel Services, 225 A & I Building, University of Northern Iowa, Cedar Falls, Iowa 50613.** Members of protected classes may feel free to identify themselves for purposes of Affirmative Action.

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ENGINEERS

## FIELD ENGINEERS

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Control Data Corporation seeks Field Engineers with maintenance and repair experience on IBM 360 and 370 systems, plug compatible mainframes and peripheral products. Prior experience with STC, ITEL and Memorex desired. These positions are located in the Florida, Georgia, Mississippi, North Carolina, Virginia and Washington, D.C. areas.

More than very competitive salaries and a wide range of fringe benefits, CDC offers:

- Extensive in-house training program to help you advance in your career.
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## Microcomputer Software Professionals

Take advantage of Ground Floor Opportunities
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Our newly formed Products Group is building a software engineering capability for commercial products. Here is your opportunity to be a part of a dynamic start-up situation within a successful, established business.

We are seeking professionals who are self-starters looking for a stimulating work environment where achievement is recognized. We have immediate openings for qualified professionals with experience in one or more of the following fields:

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- DISTRIBUTED PROCESSING
- COMPUTER NETWORKS
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You will develop software using structured techniques for state-of-the art sixteen bit microcompters in office systems incorporating advanced data management and distributed processing concepts.

System Development Corporation offers an excellent environment for professional growth. Our salaries are competitive and our benefits are among the best in the industry, including 4-weeks paid vacation the first year.

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**System Development Corporation**
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## MIS
### Programmer/Analyst to Project Leader
### Sun Belt and Metro Area

We are a Manufacturing/Distribution Company, with numerous remote locations. Our data center which has 2 IBM 3033's running under MVS/NCP. The Software is IMS DB/DC and TSO. The branch centers which total 8 have DOS/VSE 370/138's utilizing over 1800 intelligent terminals requiring COBOL/BAL language.

We offer 30% earnings over industry average: $25-$35K. Send resumes or brief letter of experience to:

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**Newton, MA 02160**

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## PROGRAMMER ANALYST
*Florida*

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**WE OFFER:**

- **Excellent salary and benefits**
- **Profit sharing**
- **Paid relocation to Orlando, Florida**

**We are seeking a data processing professional with a minimum of 4 years' experience in COBOL Programming. Additional prerequisites include exposure to systems design and project leadership in a 370 environment.**

**If you qualify send your resume with SALARY HISTORY to: Dept. RBG, Red Lobster Inns, P.O. Box 13330, Orlando, Florida 32859.**

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We've built our reputation on innovation and advanced technology because we encourage the independent, creative contribution of every one of our people. Last year we went over 300 million in revenues, up from 162 million just a year earlier, so we know our philosophy works.

If you are a self-motivator looking for a new challenge STC offers the opportunity for contribution and individual development not often found with a major corporation. Systems Engineers with STC consult and provide technical support to field sales and marketing. You set your own schedules and prepare your own presentations. And we may have a good spot for you right where you are now. Requirements include:

- A college degree (or equivalent experience)
- Knowledge of the internals of one or more IBM virtual operating systems (MVS, SVS, VSI, VM, DOS/VS).
- High level of proficiency in ALC.
- Knowledge of one or more other programming languages (FORTRAN, COBOL, PL/1).
- Ability to write and present technical materials clearly and effectively.

We are building a top-notch technical marketing support team to compliment our unequalled products, performance, and service. If you have the above credentials, we have an exceptional career for you at STC.

For fastest consideration with absolute confidentiality, send your resume in confidence to Bill Welbel, Dept. CW9/3-24. MD-3K, or give Bill a call TOLL FREE at 800-525-2940, Ext. 3012, Fred Moore at Ext. 3008 for additional information. We have a lot to say that you'd like to hear.

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STC

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# EDP RESEARCH MANAGER/EDITOR

This is a working management position that will involve the building and supervision of a staff of researcher/writers. This group will study and report on current issues and trends that develop within the data processing user community.

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Requirements of this position include the study of EDP user issues and the subsequent writing of reports (2-200 pages in length) covering the results of those studies.

Candidates for both positions must be familiar with computer hardware and software in addition to having the ability to communicate with, and interview various EDP personnel. Proven writing skills are essential. Work experience associated with a large computer installation would be a definite plus. Both of these positions will provide the opportunity for occasional travel.

IDC is the leading market research consulting firm in the computer industry. This is a major opportunity to get in on the ground floor of a new, highly successful product and grow quickly with a dynamic company. Please send resume and SALARY REQUIREMENTS to the address below.

IDC
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**ISPS Department**
**214 Third Avenue**
**Waltham, MA 02254**

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# SYSTEMS ANALYSTS PROGRAMMER ANALYST

## Pacific Northwest (Outdoor Recreation)

Due to expansion, Ore-Ida **Foods, Inc.**, a national leader in the frozen food industry, has openings for two Systems Analysts and a Programmer Analyst at our new corporate office in Boise, Idaho.

The **Systems Analysts** will help plan, design, direct, and control systems development projects from conceptualization through implementation. We prefer 5 to 7 years experience with COBOL, and DOS/VS.

The **Programmer Analyst** will assist in designing, programming and testing of computer systems. Prefer 4 to 5 years experience with COBOL and DOS/VS, solid programming, and some design.

College degree desirable. Competitive salary, liberal benefits and relocation provided. Send resume and salary history to **Employment Manager, Ore-Ida Foods, Inc., P.O. Box 10, Boise, Idaho 83707.**

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# Software & Hardware Engineers

## General Electric has opportunities in the Roanoke Valley... of Virginia.

**Circuit Design Engineer**
Develop advanced electronic circuits, analog and digital (with emphasis on analog), particularly in field of power electronics such as controlled current inverters, pulse width modulated inverters, load commutated inverters, rectifiers and series regulators. Lead laboratory evaluation of breadboard and prototype hardware. Includes software as required, as well as all documentation associated with final design. Requires BS/MSEE.

**Circuit Design Engineer**
Develop advanced digital control equipment, especially microprocessor based control, using latest signal electronics components and associated circuitry. Lead laboratory evaluation of breadboard and prototype hardware. Includes software as required, as well as all documentation associated with final design. Requires BS/MSEE.

**Software Development Engineer**
Develop software systems for others to apply to real-time industrial process control of heavy machinery. Will involve system conception, system design and diagnostic testing, systems architecture, and hardware/software trade-off. Requires BS/MSEE or Computer Science with an engineering orientation.

**Quality Control Engineer**
Develop quality control planning for equipment manufactured for industrial drive systems, automation systems, computer and microprocessor based industrial control and data systems. Requires BSEE with circuit design and/or Q.C. engineering experience.

**Quality Control Engineer**
Perform design review, QC planning for solid state power conversion, AC drive systems, and DC adjustable speed control systems. Requires BSEE.

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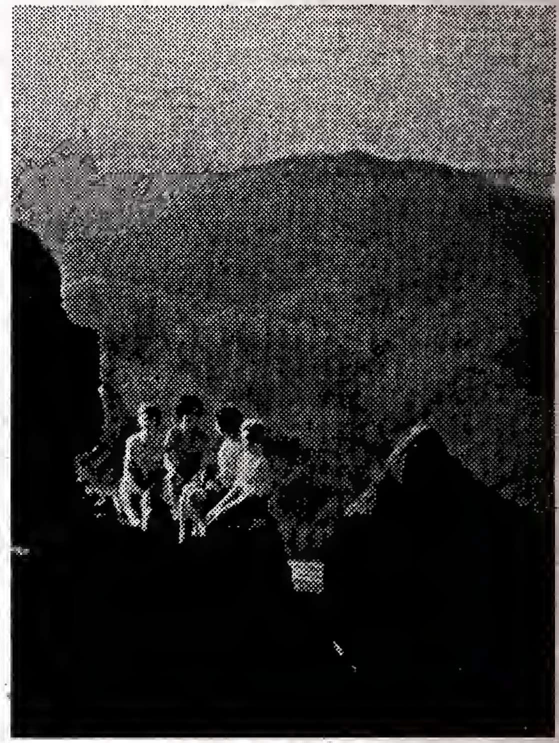
Ground floor opportunity to develop procedures for producing customer manuals using word processor. Includes planning, creation, writing and production. Publications cover power converters to microelectronics, and process computers. Requires BSEE (or equivalent); experience in technical writing for commercial products. Field experience desirable.

We'll provide fully commensurate salaries and comprehensive GE benefits including relocation assistance.



Few areas of the country can rival the scenic beauty and comfortable lifestyle of the Roanoke Valley.

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Find out more by sending your resume and salary history to Mr. T. N. Trolsen, Ref. 48R, General Electric, 1501 Roanoke Boulevard, Salem, Virginia 24153.

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# PROJECT MANAGER MUMPS

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DL/1 or IMS/DB background with Data Dictionary experience. Position is management rather than purely technical.

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Must have excellent communications skills, BS or advanced Degree, one or more years as an analyst with minimum four years programming using COBOL or PL/1.

### PROGRAMMER ANALYSTS (Business & Scientific)

BS Degree with five years programmer experience, or Associate Degree and seven years experience. Business application requires COBOL experience; Scientific application requires FORTRAN experience.

### SENIOR PROGRAMMERS (Business & Scientific)

BS and three years experience or Associate Degree and four years programming, COBOL or FORTRAN.

Permanent positions, excellent benefits and opportunities. Send resume to

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## PROGRAMMER

National transportation firm located in western suburb of Chicago seeks another professional to round out its D.P. staff. Responsibilities include development of new and maintenance of existing programs in an on-line (CCP) environment. Excellent opportunity for an individual experienced in RPG II and System 3. Familiarity with arrays desirable. Comprehensive benefits and salary commensurate with experience. Send resume or contact Sidne Pflum:

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## PROGRAMMER OVERSEAS
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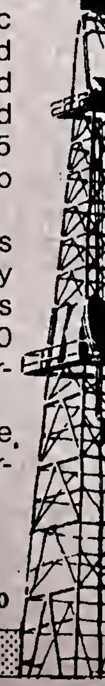
Candidate must possess a Degree plus a minimum of five (5) years experience in scientific applications related to petroleum geological and geophysical systems—primarily mapping and well log applications. Proficiency in Fortran and Assembler plus experience with IBM 370/135 DOS/VS, POWER/VS, 3270 Terminals, Calcomp plotter is preferable.

Salaries commensurate with experience, plus generous overseas premium, plus an extremely attractive savings plan and other benefits, plus tax advantages, plus family residence, plus 30 days annual vacation and an excellent opportunity to travel and save money.

All replies confidential. Send complete resume, of work experience, salary requirements and personal data to:



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## CHIEF SYSTEMS ARCHITECT
### A major career opportunity at fast-expanding NCR/Ithaca

The phenomenal, high-momentum growth of NCR/Ithaca has created a major opening for a Chief Systems Architect on intelligent terminals.

Reporting directly to the Director of Engineering, you will be expected to direct other division architects in the design of custom VLSI for the intelligent and interactive terminal family now being developed. Strong interpersonal skills are a necessity.

You must have complete, up-to-date knowledge of the advantages and disadvantages of all intelligent terminal architecture in the marketplace today and be able to make recommendations for superior follow-on designs.

Experience with digital and analog techniques, circuit design, component development, application of LSI and appropriate analytical tools are all necessary, as is a thorough knowledge of all available microprocessors and other integrated circuits. A general understanding of computer architecture used in minicomputers and mainframes is also desirable.

Your engineering background should be that usually associated with an advanced degree. You will also need a high degree of practical creativity as well as the good design judgment that comes from ten or more years experience in developing computer-related devices.

Salary will be high, and company-paid benefits, including relocation and househunting allowances, are what you'd expect from a Fortune 100 corporation.

### The Finger Lakes Region

You will not only have an opportunity to join the world's second largest computer company in a senior position, but you'll be living in the heart of the beautiful Finger Lakes region. The NCR/Ithaca facilities are in a picturebook setting overlooking Lake Cayuga and nearby Cornell University.

Please send resume and salary history to Mr. B.W. Pitzer, Manager Professional Recruitment, Dept. E50, Engineering & Manufacturing/Ithaca, NCR Corporation, 950 Danby Road, Ithaca, NY 14850.

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## IMS Programmer/ Analysts $20 to $25K
### San Francisco

Our Bay Area clients have immediate openings for IMS Programmer/Analysts. Positions require a minimum of 2 years in data processing with 1 year in IMS COBOL applications. Prefer Manufacturing, Finance or Distribution Applications. Positions include relocation and excellent benefit packages.

**We are consultants to management. Please send resume and salary history in confidence to: Gary R. Schultz, One Maritime Plaza, Suite 1350, San Francisco, California 94111. (415) 956-7120. Employer assumes fee.**

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## DP AUDITOR

Challenging position on coroporate audit staff of leading aerospace organization located in Hawthorne. Our program includes various types of system reviews, operational reviews and computer program verifications.

Education and/or industry related working experience is required in the following areas:

- Internal, independent auditing or consulting
- Business, financial or accounting
- Data processing systems or operations

BS degree preferred — CPA, CDP or CIA desirable. Salary commensurate with qualifications. No mandatory travel. Send your resume in confidence to the Employment Department.

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PROGRAMMERS

# SYSTEMS and SCIENTIFIC PROGRAMMERS

CSC. the world's largest independent computer software company, is seeking systems and scientific programmers for growing long term projects. An immediate need exists for programmers with five or more years' experience in FORTRAN and Assembly Language programming. Well-rounded experience in design, code, test and documentation of programs is required. Experience in real-time mini-computer applications, communications, or command and control systems is desirable.

Selected candidate will find that CSC offers excellent compensation and long term career opportunity in our challenging field. For immediate consideration, call collect or send resume to:

**JOE FRAZIER**
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Mgrs. Technical Support
Mgrs. Operations
Mgrs, Data Processing/MIS
Mgrs, IBM System 3/34/38

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**Send us your resume, we will review it and contact you.**

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# COME GROW WITH US!

In less than 20 years, Continental Telephone has become the third largest independent telephone company in the U.S. and is ranked in the top 300 U.S. corporations (Forbes '78). Due to our growth, we are seeking results-oriented professionals to fill the following positions:

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### (Technical Support Administrator)

The Technical Support Administrator is responsible for all software development associated with a major telecommunications centralized switching maintenance project under development by corporate headquarters staff. Responsibilities include functional specification proposals, software contract administration, implementation scheduling and quality control.

Requirements include a solid programming and analyst background in the Honeywell level 6 field and past experience with GCOS 6/MOD 600 operating systems. Experience in the telecommunications field is desirable.

## PROGRAMMER ANALYST

Responsibilities will include applications software development for a major telecommunications centralized switching maintenance project in a Honeywell level 6/MOD 600 environment utilizing transaction processing and data base management. Additional responsibilities include system design, program coding, test data generation and system implementation.

Requirements include a BS degree in Computer Science or equivalent experience and a minimum of 3 years data processing in all aspects of programming, testing and debugging. Knowledge of COBOL essential. Experience with Fortran or data communications processing a definite plus. Must have good oral and written communications skills.

We are an equal opportunity employer offering compensation which includes a competitive salary, life, health, and dental insurance and a pension program to assist your growth, personally and professionally. We provide training and development programs and tuition reimbursement. Please send your resume, including salary history and expectations to DAVID A. BELL.

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# HOUSTON PROGRAMMER/ ANALYST

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Participate in a major project to up-grade our business information systems to the latest on-line integrated applications. Experience with Basc-Plus, COBOL and RSTS. Requirements definition and package software conversion/implementation experience a plus.

## ENGINEERING SYSTEMS P/A

Be a key figure in the development of an on-line computer based engineering system for metal buildings design.

Experience with FORTRAN and RSX as a Civil Structural Engineer or a metal building company a must. Interactive graphics, AUTO/STEEL, Computer Engineering Design/Drafting experience a plus.

We offer excellent salaries with exceptional benefits package. Resumes may be mailed to:

**Frank Smith**
**Director of Data Processing** **(713) 666-1941**

**KIRBY BUILDING SYSTEMS, INC.**
**P.O. Box 36429** **Houston, Texas 77036**

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2) 4% sales tax
3) 3,000 hours of glorious sunshine
4) 'STATE OF THE ART' — Hardware/Software
5) One of the nations rapidly growing D.P. communities

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| ***Data Base Analyst**<br>IMS or IDMS experience | **$19-25,000** |
| ***Sys Project Leader**<br>large IBM,<br>IMS background | **$24-33,000** |
| ***Programmer Analyst**<br>COBOL, OSJCL,<br>DE-BUG/READ DUMPS | **$17-23,000** |
| ***Software Specialist**<br>SYSGEN, PTF's,<br>INTERNALS - OS/DOS | **$20-25,000** |
| ***Programmers**<br>COBOL, BAL, RPGII, etc. | **$16-20,000** |

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## Outstanding Opportunity

for a talented analyst programmer in a profitable firm. Firm oriented towards in-depth, high technology research, analysis, and marketing. Work directly with firm partners in a flexible and growing environment. Need Cobol knowledge and some experience. For a position with reward in line with contribution, both short and long-term. **Call Tom Johnson in Hartford at**

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## PROGRAMMER ANALYST

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**St. Elizabeth Hospital**
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# INSIDE FAIRCHILD

# CLOSE-UP: Applications Marketing Engineers

A number of senior applications engineering positions are available for aggressive FACTOR programming or test engineering individuals who are looking for a growth path in technical marketing. These openings involve device program analysis, testing and marketing, and customer support for a growing business segment. All positions require a BA degree or an equivalent combination of education and experience in electrical engineering, computer science, or related scientific disciplines.

If you wish to combine your technical training with a career in a rapidly growing marketing organization, please send your resume with salary history to Bob Elliott, Fairchild Test Systems Group, 1725 Technology Drive, San Jose, California 95110, or call (408) 998-0123, Ext. 488.

At Fairchild, we're proud of our efforts as an affirmative action employer and we encourage women, members of minority groups and the handicapped to apply.

## Openings on the San Francisco Peninsula.

**FAIRCHILD**

**We started it all.**

## WALT DISNEY PRODUCTIONS CAREER OPPORTUNITIES

### REAL TIME PROGRAMMER

Three to five years data general experience in a hands-on environment with mini-computers with Real Time applications. Degree in technical area preferred but not mandatory. Assignment will be with a small staff developing computer based systems for Walt Disney World, Disneyland, Tokyo and Houston People Mover project.

### PROGRAMMER ANALYST

Qualified applicants should possess 2-5 years experience in design and programming of business applications. This is an opportunity to become involved in a wide range of business applications, including interactive programming in an on-line virtual memory environment.

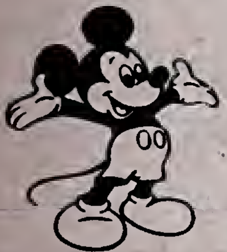
### SYSTEMS PROGRAMMERS — MIS

Tech support staff.

This position requires assembly language, programming proficiency with a minimum of one to two years experience in one or more of the following areas:

Virtual Memory Internals
VM Systems General/Maintenance
Technical Support
Performance Analyst

Qualified applicants should submit a complete resume with salary history to:



**WALT DISNEY PRODUCTIONS**
**Professional Staffing**
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## DP MANAGEMENT Mid $30's

Billion dollar Chesapeake Bay area bank seeks an experienced DP Manager for a senior management position, reporting to the VP, DP Operations. This highly visible individual will be responsible for hardware/software analysis and selection, operational/systems management and long range planning. Excellent communications skills and a solid record of management achievement are required. Additional bank operations experience a positive plus.

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## MANAGEMENT CONSULTING DATA BASE ADMINISTRATION

The Chicago office of a national management consulting group is expanding its Data Base consulting staff as a result of continuing growth in our practice. We seek specialists with experience utilizing Data Base and Data Dictionary concepts and techniques to solve our clients business data processing problems. A background in the use and administration of at least one data management system coupled with additional practical experience is required.

This is an opportunity for self starting individuals to utilize problem-solving skills and the latest software technology in a management consulting environment. Some travel is required.

If you possess strong analytic ability, above average communications skills, and a seek a challenging, fast paced, and demanding professional environment, send us your resume in confidence for further consideration. Our staff is aware of these openings.

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## CAREER OPPORTUNITIES
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IIT Research Institute, a leading scientific research organization, is currently seeking professionals with experience in one or more of the following areas:

***Software Engineering**
***Data Base Management**
***Software Reliability**
***Computer Programming**
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***Software Maintenance**
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If you are interested in professional growth, increasing responsibility, advanced educational opportunities and would like to live in Upstate New York where you will enjoy casual living and easy access to year round recreational activities, please send resume and salary history to:

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## FLORIDA

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| P/A | Burr Banking | 15K |
| P/A | DOS/VS CICS Cbl Mfg | 18K |
| DBA | IMS Hvy Mfg cobol | 23K |
| P/A | Sys 34 Oper/Prog | 18K |
| P/A | NCR G/L, A/P, A/R | 20K |
| Sys Prog DOS or OS on line | | 22K |
| Tech Writer 3 yrs software | | 20K |
| P/A | IBM Banking Cobol | 18K |
| Ops Mgr DOS/VS CICS | | 17K |
| P/A | Insurance | 20K |
| P/A | IMS Cobol | 18K |
| Proj Ldr IMS - Travel | | 27K |

Many others to choose from. All fees and relocation paid. Mail resume to or call collect

STAN ALLEN
**ROBERT HALF**
OF TAMPA, INC.
**1311 N. Westshore Blvd.**
**Tampa, FL 33607**
**(813) 876-4191**

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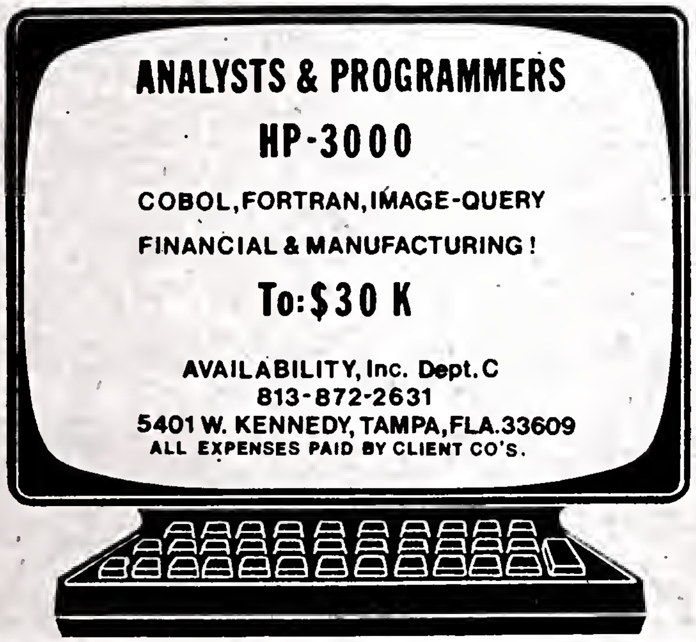

## ANALYSTS & PROGRAMMERS
## HP-3000

COBOL,FORTRAN,IMAGE-QUERY
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**To:$30 K**

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ALL EXPENSES PAID BY CLIENT CO'S.

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## COME LIVE IN THE ROCKIES!!!

Denver based firm is looking for a programmer/analyst experienced in Cobol/Fortran. If you have worked with on-line program and communication development, index sequencial file systems and engineering programming and want to live in greater Denver, Colorado, send a resume with salary requirements to:

**Don Shurgot**
**P.O. Box 39068**
**Denver, Colorado**
**80239**

---

### SYSTEMS & PROGRAMMING MANAGER
### TO $30,000

Major S.E. Financial Institution expanding DP organization seeks individual to supervise 10-15 professionals on a variety of Banking/-Fin. projects. Requires extensive bkgd. in bank systems such as demand deposits, Visa or Mastercharge, on-line transactions systems. Excellent growth opportunity in one of the most sophisticated IMS environments in the S.E.

### PROJECT MGR.
### TO $40,000+

S.E. Fortune 100 firm building a new Distribution Center seeks person to develop auto-warehouse and distribution systems and supervise 12-15 DP professionals. Req background in auto-warehouse & distribution systems and knowledge of IBM hardware & communications. Excellent growth. Indiv. will immediately begin selecting new staff.

Above represent a partial list of active positions. Client co's pay all employ exp. Contact Ron Spang 404/393-0933, or send resume in confidence, including current salary to:

***FOX-MORRIS***
**Personnel Service**
**47 Perimeter Ctr. East, N.E.**
**Atlanta, GA 30346**

---

## TECHNICAL SOFTWARE SPECIALIST

Rubbermaid a leading producer of plastic & rubber products with sales over $250. million has an immediate opportunity in their Corporate Information Systems Department.

The responsibilities of this position include maintaining operating system on a current basis with information supplied by Honeywell Information Systems, Inc., maintain software supporting the communications system with information supplied by Honeywell, provide assistance to time sharing analyst, assist in determining cause of system failure, study and recommend techniques of programming as related to software packages, assist in establishing procedure changes in operating Honeywell 66 DPS remote terminals, remote computers or communication system. You would get involved with some training of programming members in techniques as related to operating systems, software packages, such as I.D.S., I.S.P., etc. The ideal candidate will possess:

- B.S. or B.A. or its equivalent in knowledge, skill & mental development.
- 3 yrs. experience in applications programming using a large scale computer and an operating system.
- Thorough knowledge of computer and communications hardware in relation to specific data processing requirements.
- Thorough knowledge of data processing systems including analysis, design, and control of information systems.

We offer excellent income and benefits for the right person. If you qualify, please send resume in complete confidence to:

Barry Musselman
**RUBBERMAID INCORPORATED**
1147 Akron Road
Wooster, Ohio 44691
An Equal Opportunity Employer M/F

Rubbermaid®

# Data Processing Manager

## SOUTHERN CALIFORNIA

Rapidly growing Glendale-based (suburban Los Angeles) manufacturing company seeks a skilled and experienced D.P. Manager to operate, program and install our new IBM System/34 (future expansion to IBM System/38).

Great opportunity to get in on the ground floor and use your skills to implement and develop the MAPICS applications.

We offer a competitive salary plus such outstanding benefits such as:

- **13-paid holidays**
- **Company paid Medical insurance**
- **Company paid Dental insurance**
- **Company paid Visual insurance**
- **Company pays dependent cost**
- **Company paid Life insurance**
- **Company paid Retirement Plan**
- **Liberal paid vacation**
- **Paid sick-leave**
- **Job security**
- **Paid shut-down between Christmas and New Year's**

*Please send resume including salary history to:*

**CW Box 2076**
**797 Washington St., Newton, MA 02160**
Equal Opportunity Employer M/F

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## MAURICES

## POINT OF SALE MANAGER

Maurices Incorporated, an expanding retail fashion group of 230+ stores throughout a 19 state area, needs an ambitious manager for the development, design and installation of I.B.M. Point of Sale systems. This individual will be directing the initial and ongoing installation of the most modern P.O.S. equipment available today. If you possess a strong background in the following areas, you will want to join us in Duluth for this exciting opportunity.

**-Retail store operations**
**-Systems analysis and design**
**-Communication networks**
**-Accounting controls**
**-Project management**
**-Documentation and procedures**

**We offer excellent salary and benefits. Send your resume in confidence to Jayne Ridge, Personnel, Maurices Incorporated, 105 W. Superior St., Duluth, Minnesota 55802 or call (218) 727-8431. All replies confidential.**

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frank leonard
PERSONNEL

## *SUNBELT OPPORTUNITIES*

BSEE's with 3+ years experience in LOW VOLTAGE POWER SUPPLIES and SYSTEM DESIGN. Salary to $40,000. All expenses and relocation paid by client company. Submit resume with current salary, or phone:

**FRANK LEONARD PERSONNEL**
SUITE 100, DEPT. 301
1211 NORTH WESTSHORE BLVD.
TAMPA, FL 33607
**(813) 872-1853**

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# SYSTEMS MANAGER

Carter Hawley Hale Store's Information Systems Division is a sophisticated data processing support function essential to our rapid growth in the retail market. We are currently seeking a versatile professional with extensive management and systems experience.

As Credit Systems Manager, the successful candidate should have a bachelor's degree, credit systems experience, and 5-10 years in a management capacity. As part of our all pro management team this individual will be working with an IBM 370/158 and 168 running under MVS and JES2 with a 3033 coming soon.

Excellent compensation and benefits package highlight this attractive opportunity. For immediate professional consideration, we invite you to forward your resume or call L. Ford at (714) 533-9503.

## Carter Hawley Hale Stores, Inc.

1600 North Kraemer
Anaheim, CA 92806

An Equal Opportunity Employer M/F

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# Systems Analyst & Programmer Analyst

## For Washoe Medical Center in the Beautiful Reno-Lake Tahoe Area

NCR or hospital experience preferred. COBOL experience required. Competitive salary commensurate with experience. Generous benefits package including State of Nevada retirement plan and excellent working conditions in our 565-bed regional medical center. **Apply at WASHOE MEDICAL CENTER, Personnel Dept., 77 Pringle Way, Reno, Nevada 89520, or call collect (702) 785-4156.** An equal opportunity employer.

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## IMS SYSTEMS PROGRAMMER

New York State Electric & Gas Corporation, a private investor-owned utility located in upstate New York, has an opening for an IMS Systems Programmer.

Hardware and software include 370/168 AP, 3350's, 3800, RJE, Remote & Local 3270's, MVS, JES2, IMS/VS 1.1.4 DB/DC. Panvalet, Roscoe, BTSII, Control/IMS. 2-5 years experience with IMS SYSGEN, DBD & PSB Gen, Database Design, SMP, PL/I, JCL, Assembler, OS/VS utilities, VSAM desired. Must possess good verbal communication skills and work well in a support team environment.

**Please submit resume & college transcripts (unofficial copies acceptable) to: Mr. Wayne Voorheis, Personnel Manager, New York State Electric & Gas Corporation, Box 287, Ithaca-Dryden Road, Ithaca, New York 14850.**

**An EEO Employer M/F**

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## BURROUGHS

## PROGRAMMER/ANALYSTS

Minimum of 3 years experience in COBOL on small, medium or large systems.

Immediate openings. Excellent opportunities with a growing software development company in the San Diego, CA area. Competitive salary, based on experience.

Special consideration given for THRIFT System and/or S-1000 experience.

**Send resume and salary history to:**
**EDP MANAGEMENT, INC.**
**5465 Lake Murray Blvd.**
**La Mesa, CA 92041**

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## COMPUTER/DATA PROCESSING FACULTY MEMBER

Subjects to be taught may include: Data Processing Principles, COBOL, FORTRAN, BASIC, other business Languages, Systems, and other related Data Processing courses. An M.B.A. or equivalent and business experience are required. Send resume to:

**Business Services Chairman**
**University of Houston**
**Downtown College**
**One Main Street**
**Houston, TX 77002**

*Closing Date: Nov. 1, 1979*
Eq. Oppty/Affirm. Act. Emply.

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## MARKETING REPRESENTATIVE

Marketing representative to sell minicomputer hardware (Datapoint) and software package developed for petroleum jobbers. A strong working knowledge of small business accounting and operational environment is essential. Programming experience is **not** required, but a fundamental knowledge of software concepts is important. You will be selling for a prestigious company with an excellent record of implementing solid systems. Prices for the complete package range from $40,000 - $140,000. Several geographic areas to choose from with an attractive commission program. **Send resume to GISI, 155 S.W. Madison, Corvallis, OR 97330.**

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## Utah State University
## Computer Technician

Construct, debug, repair micro-computer equipment. Assist in design/development of new applications of micro-computers. Generate and maintain documentation. EE degree or equivalent with emphasis in digital electronics and 2 years micro computer experience required. Contact:

Martell Gee, UMC 37
**Utah State University**
Logan, Utah 84322.
*An AA/EOE Employer*

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# DATA PROCESSING OPPORTUNITIES IN THE GREAT MIDWEST

Misco Industries, Inc. is a diversified Corp. with primary interest in sales and distribution of equipment and supplies used in the petroleum exploration and production industry. We are scheduled to install an IBM 4331 computer in April 1980. Currently running an IBM 360/40 with Dos and CICS. DOS/VS, Power/VS, VSAM, COBOL and CICS/VS will be primary software considerations. Expansion has created the following career opportunities:

## SYSTEM ANALYST —

Person to be capable of working directly with end-user in designing, programming and implementation of systems. CICS applications design and programming experience required. Minimum of 3 yrs design experience required.

## PROGRAMMER/ANALYST —

Sr. Cobol programmer with minimum 2 yrs experience required. CICS programming background desirable.

Please send resume complete with salary requirements in confidence to:

**William Baker Mgr-EDP**

**MISCO INDUSTRIES, INC.**
**257 N. BROADWAY**
**WICHITA, KANSAS 67202**

*An equal opportunity employer*

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# MANUFACTURING SYSTEMS DEVELOPMENT

A challenging and highly visible position now exists for a degreed professional who is thoroughly familiar with RPG and IBM Systems 32 & 34 or the equivalent.

You will be solely responsible for the development and implementation of manufacturing, accounting and other systems for this rapidly growing division.

If you have the background we seek, you should investigate this challenging position and enjoy life with us in the 1000 Islands. We offer a competitive salary and a comprehensive benefits program.

**To apply, send your resume to: Personnel Dept.**
**Northland Division,**
**The Scott & Fetzer Company**
**968 Bradley Street,**
**Watertown, N.Y. 13601.** Equal opportunity employer m/f

SF NORTHLAND DIVISION

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# SENIOR SYSTEMS ANALYST

International Commodity Trading firm has an immediate requirement for a Sr. Systems Analyst/Asst DP Mgr with a minimum of 3-yrs experience designing & working with on-line realtime data entry systems. We have recently installed a data general Eclipse M-600 with a 512 KB Main, 192 MEG Disk operating under AOS with INFOS, IDEA, COBOL, BASIC, & RPG II. If you have the following:

- **Working knowledge of data machines**
- **Working knowledge of RDOS or AOS with INFOS**
- **Proficiency in COBOL programming using top down structured techniques.**
- **Working knowledge of data base or advanced file handling techniques.**
- **Minimum 6-yrs experience in business/accounting applications.**

**CALL . . . BILL HINTON**
**Balfour, MacLaine, International, Ltd.**
**at (212) 425-2100 EXT 268**
**or Rush Resume to:**
**BMIL, 88 Pine St, New York, N.Y. 10005**

Data Processing

# PROJECT LEADER
# SALARY TO $28,000

An exceptional career opportunity exists with the Wisconsin Department of Transportation for an accomplished financial systems professional to immediately assume project leadership responsibility with the Bureau of Systems and Data Processing. You'll be working on an advanced computer system — Amdahl 470V/6 operating under MVS with JES2 and supporting an extensive Data Base/Data Communication function including the use of TCAM, IMS and File Handler (DB System developed in-house), along with Data Dictionary facilities, TSO, MARK IV and numerous other application support facilities — in an environment that encourages new ideas and rewards initiative.

This highly responsible position requires 5-7 years of successful accomplishments and innovations in Programming and Systems Analysis of Financial/Accounting systems and is best suited for the individual with a demonstrated ability to plan, coordinate and implement large system projects. Degree preferred, but not required.

Our Madison, Wisconsin, location is ideal, offering a versatile combination of cultural, academic, medical and recreational facilities in a picturesque setting which is enhanced by four lakes, fresh air and seasonal changes.

You will find the challenges and opportunities for professional growth and advancement are great as a member of the Wisconsin Department of Transportation. In addition, we offer a complete package of benefits and continuing education courses to update your skills and keep you in tune with the state-of-the-art. For immediate consideration, send your resume or contact John Salling at (608)266-0436.

**John Salling, BS & DP**
**WISCONSIN DEPARTMENT OF TRANSPORTATION**
**P.O. Box 7915**
**Madison, WI 53707**

**An Equal Opportunity Employer M/F**

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# SCIENTIFIC APPLICATIONS PROGRAMMING

Union Carbide Scientific Computing Applications Department in Charleston, WV has career opportunities for PhD/MS in mathematics and related disciplines desiring to make a career change in the direction of applied computer systems development.

The primary work will be definition, analysis, design, programming, testing, implementing and maintaining applied computing systems for use by engineers and researchers in the development of new chemical processes and in manufacturing/distribution planning and operations within Union Carbide.

Typical of the computer systems projects which the individual will be assigned to work independently or in a team are: work scheduling, capital budget planning, automated process design, graphics, optimization of production/distribution planning and lab automation.

The applicant must have a strong academic background, good interpersonal and communication skills, and a strong interest in programming, system design and development. Applicants should send a resume, a transcript or equivalent indication of quality and type of academic background, and the names of three references that could be contaced once a mutual interest were established. Resumes should be sent to: **Mrs. Charlotte Fitzwater, Union Carbide Corporation, P.O. Box 8361, Bldg. 3007, South Charleston, WV 25303. An Equal Opportunity Employer.**

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# DIRECTOR OF DATA PROCESSING

## Assume Full Control of all DP Operations

Major hospital facility located on Chicago's near north side currently seeks a top-notch professional to head-up all aspects of its highly sophisticated data processing operations. Selected candidates will plan, organize and control all EDP and information systems including operation activities, as well as supervise all DP staff members of this progressive 370 system installation. Position will involve heavy interface with department users, planning new systems and modifying existing systems, scheduling programs, and planning new equipment purchases and handling internal training.

Candidates must demonstrate a thorough understanding of project control, review and reporting, as well as methodologies used in establishing time frame and manpower requirements. Some background in budgeting, in-service training, job scheduling, Q C and hardware software evaluation and IBM system operation techniques required.

Excellent salary and full benefits accompany this exciting career advancement opportunity. For confidential consideration, forward detailed letter or resume in confidence with salary requirements to:

**CW Box 2073**
**797 Washington St.**
**Newton, MA 02160**

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Holiday Inn

# Our Needs and Your Goals . . . .
## They have a way of working together for great careers.

Holiday Inns, Inc., the 1 billion dollar, international leader in the lodging, food service, casino, and transportation industries, has many challenging opportunities in our pace-setting data processing environment.

You will be working with state-of-the-art hardware, software, and development techniques (most already here, others due soon), such as:

- TSO/SPF interactive programming support
- TOTAL data base systems
- IBM 370/158 and 168 processors
- DEC PDP 11/35 and KS 10 512K time-sharing processors
- Structured programming techniques
- HIPO and TOP down system design techniques
- On line systems development
- Minicomputer systems

The department, situated in our sprawling, 85 acre corporate office park, reports directly to the president of the corporation. Your career at Holiday Inns provides you with ample room to diversify in other DP areas and beyond. Our keen emphasis on your ongoing education and development assures you concrete potential to move ahead, and if you chose, to specialize in a given field. We offer competitive salaries and very generous fringe benefits, plus the practical advantage of enjoying a systematic work schedule. If our needs parallel your goals, you owe yourself a wide-open opportunity for achievement.

# PROGRAMMER ANALYSTS PROGRAMMERS

Experience in Cobol and IBM 370 Systems is a necessity. Applications are diverse relating to Holiday Inns business activities — hotels, buses and steamships, institutional products and furnishings, restaurants and casinos — involving such activities as:

- Minicomputer installation for Inn automation
- Hospitality industry data base design and support

For immediate attention to these career-growth opportunities, call collect or send resume in confidence to:

Sandra Root
HOLIDAY INNS, INC.
Human Resources
3742 Lamar Ave.
Memphis, Tennessee 38195
(901) 369-5562

Holiday Inns
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# Programmer/Analyst II
## University Computing (2 positions)

To analyze, design and implement new systems and procedures and to write and maintain computer programs for use by the University community. Qualifications: 1-3 years computer programming experience plus successful completion of computer science courses is necessary. PL/I experience is desirable as is a Bachelor's degree. Salary range: $13,894 - $18,464. To be considered for the above positions a standard application may be obtained from and must be returned to:

**Eastern Michigan University**
Personnel Office
112 CW Welch Hall
Ypsilanti, MI 48197
**(313) 487-3430**

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# N.Y. CITY

**— CONTRACTS, To**
**$200/DAY**
**— FULL TIME, To**
**$35,000**

- **MINI ASSEMBLER/BASIC**
- **IBM COBOL, BAL or PL-1**
- **CICS or IMS or MARK IV**
- **PDP/11**

Call or forward resume to:

**PARAMOUNT CONSULTANTS**
275 Madison Avenue
New York, New York 10016
**(212) 684-6606**

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**City of Eau Claire seeks analyst programmer.** Requires systems design and COBOL programming experience and good oral and written communication skills. Municipal government and H-P 3000 II experience desirable. For immediate consideration, send resume and salary history to: **Department of Human Resources, P.O. Box 148, Eau Claire, WI, 54701.**

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# DIRECTOR-COMPUTER CENTER

The Director reports to the Administrative Vice President, coordinates the work of the college's Computer Center, serving administrative as well as academic needs; plans near and long range direction of computing for campus. Significant management experience required. Ability to work effectively with others. Demonstrated ability in overall analysis, design, programming, and implementation of major system projects. Familiarity with a variety of data processing equipment and Bachelor's degree required (Master's preferred). Knowledge of COBOL programming language and experience with Burroughs computer system desirable. Send resume to:

*Mrs. Lorreine L. Begley,*
*Affirmative Action Officer, HAB 902*

**State University College**
New Paltz, New York 12562

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# EDP PROFESSIONALS

We are conducting an ongoing search for many of the Southwest's leading companies. Five years successful data processing recruiting has given us an in depth market knowledge as well as a large data base of clients. Below is a partial listing of positions available:

Salaries range from $18,000-$35,000

Systems Software Programmers
Tech Support Managers
Sr. Systems Analysts
Programmer/Analysts
TP Specialists
CICS Programmers
EDP Auditors
Scientific Programmers
Software Engineers
Process Control Programmers

Give us a call, or send a resume and let's discuss the many opportunities available. Fees paid by our client companies.

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Personnel Consultants
901 Ridglea Bank Building
Fort Worth, Texas 76116
**(817) 732-8191**

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# ARE YOU READY FOR THIS?

Trout Fishing, Elk Hunting, Skiing, Bob Marshall Wilderness, Glacier National Park, all of the BIG SKY COUNTRY at your disposal.

Progressive Montana based Computer Center is seeking individual epxerienced in NCR's CIF and FCS. Ideal opportunity if you are a take-charge type of person. Would be a good upward move if you are currently involved in these activities as a team member. Salary based on qualifications and experience. **Send resume to P.O. Box 2308, Great Falls, Montana 59403.**

**BANK OF MONTANA SYSTEM**
**COMPUTER CENTER**

# ROSS LABORATORIES

is a division of Abbott Laboratories
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## TIME SHARING SPECIALIST

The incumbent will coordinate the efficient development and application of time sharing support services, recommend efficient use of in-house time sharing facilities, as well as services offered by outside time sharing vendors to all users of such services within the Division. This position requires excellent written/oral skills and at least 3 years experience in development and implementation of time sharing application in business and technical areas.

Experience in administration/coordination of time sharing support services including cost/benefits analysis, knowledge of VM-CMS operating systems, BASIC, FORTRAN and application packages. BS degree in business Administration or Quantitative Science is desired.

Please send resume along with salary requirements, in confidence, to: Rick Copp, Employment Manager.

**ROSS LABORATORIES**
Division of Abbott Laboratories, USA
625 CLEVELAND AVENUE
COLUMBUS, OHIO 43216

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Would you leave your current position for a **BETTER** opportunity in the

**SAN FRANCISCO BAY AREA?**

Our client firms are currently seeking experienced professionals for the following positions

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| Supervisor/Mgr of Applications Programming | 33K |
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| Sr. Programmer Analyst (prefer financial or mfg) | 31K |

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Suite 212. Mt. View. CA 94040

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## Computer Professionals

Deere & Company, a leading manufacturer of agricultural equipment, has openings for the following positions:

### SYSTEMS ANALYSTS

You must have a minimum of 2 years experience, including IMS and COBOL, in an IBM environment, preferably in manufacturing areas. Responsibilities will be varied.

### PROGRAMMERS

Prefer a minimum of 2 years experience including IMS with IBM equipment plus a knowledge of COBOL in a manufacturing environment.

We offer qualified candidates excellent starting salaries and comprehensive company-paid benefits including paid relocation to Iowa. For consideration, direct your inquiry with salary history to:

JOHN DEERE

**Ronald H. Like**
**Dept. PE-60**
**Deere & Company**
**Moline, Illinois 61265**

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## HOUSTON

### ASSEMBLER LANGUAGE

Experience on IBM OS/-DOS. Any type applications experience. Many challenging positions in financial, manufacturing, energy, etc.

Interview, relocation and fee are company paid.

**Call Jim Fleming at 713-961-3271 collect or send a copy of your resume to:**

**ROBERT HALF**
**OF HOUSTON, INC.**
4801 Woodway, Ste 231W
Houston, TX 77056

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## SYSTEMS and PROGRAMMING MANAGER

### *$38,798 STARTING. EXCELLENT BENEFITS*

The LACCD seeks a strong administrator to serve as division head. Requirements:

Graduation from 4-year experience in data systems analysis and design for a large scale, third generation, multi-programmed computer, including two years at supervisory level. Additional experience may be substituted for college requirements.

IBM 370/158 w/4 Meg main memory. Under SVS using IMS/VS, CICS/VS, TSO & TCAM. Supports APL, ATMS and VSBASIC. Network-9 Campuses & Adm. office. Distributive processing, under Dial-up & dedicated lines. Shop language ANS COBOL V4. Major systems-on-line in data base environment. Upgrading to triple processor fully integrated system w/4 network processors.

Call (213) 628-7788, X241
L.A. Community College District
Classified Examinations

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## KANSAS CITY

**We represent the finest clients in Kansas City and throughout the Midwest. Outstanding opportunities for Programmer/Analysts and Software Programmers with OS/COBOL BAL, MVS, CICS or IMS experience. Salary range $18K - $28K.**

6405 Metcalf Shawnee Mission,
Kansas 66202, (913) 236-8288

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## DALLAS

**Scientific P/A's, FORTRAN & Engr. software Specialists, exper. in physical systems & Micro/Mini Assembly language. Degree req'd, aerospace bkgrd. a plus. Salaries to mid-$30's.**

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Dallas, TX 75207, (214) 637-6360

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## FT. WORTH

**Enjoy life in Texas biggest little city.**

| | |
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| **IMS internals** | **$25-27K** |
| **Mfg./CICS** | **$21.5K** |
| **S/34 Manager** | **$21K** |
| **FORTRAN/APL** | **to $30K** |
| **VS/1 software** | **$24K** |
| **Banking** | **$20K** |

Suite 911, One Summit Ave
Ft.Worth, TX 76102, (817)336-4565

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## TULSA

**Listed below are a few of the excellent opportunities available in America's most liveable city:**

| | |
|---|---|
| **FORTRAN, P/A** | **26K** |
| **Oil & Gas, P/A** | **28K** |
| **Mini, PL/1** | **25K** |
| **IMS, P/A** | **22K** |
| **PDP, Assembler** | **25K** |

2624 E. 21st St., Tulsa, OK 74114
(918) 747-3621

DATA PROCESSING CAREERS inc

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READY FOR A NEW CHALLENGE?

Pacific Northwest
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A Professional Recruiting Agency
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PORTLAND, OREGON 97204
(503) 222-6461

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**tenure-track position** in Computer Science, Department of Physics and Computer Science, Murray State University, Murray, KY, is now open for application by qualified candidates. Position available January 1980 or August 1980. Prefer Ph.D. in Computer Science with strong teaching and research capabilities. Candidates with degree in a related field will be considered. Salary and rank dependent on qualifications and experience. Applicants should send a resume and three letters of reference to:

Robert C. Etherton, Chairman
Department of Physics
and Computer Science
Box 2109, University Station
**Murray State University**
Murray, Kentucky 42071

*Murray State University is an EO/AAE*

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## Director Information Systems Idaho Supreme Court

Position involves responsibility for planning, directing and coordinating the development, maintenance and refinement of statewide court information systems. Other duties include day-to-day supervision of computer center and related management systems analysis. Bachelor's degree plus four years experience in systems analysis, ADP operations and management, and the ability to work productively in system projects with nontechnical personnel. Salary range $21,000 to $30,000. Submit resume to

**Administrative Director**
**of the Courts**
Supreme Court Building
451 W. State Street
Boise, Idaho 83720

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Service Merchandise, located in Middle Tennessee, is presently one of the largest CATALOG SHOWROOM Companies in the country. Our aggressive expansion plans have created the following openings:

SENIOR SYSTEMS ANALYSTS
SYSTEMS ANALYSTS
PROGRAMMER ANALYSTS

We have a dual H66/60 central computer, and an extensive data communitions network using mini-computers. Experience in Financial, Distribution, Retail Merchandising Systems, a definite plus.

We offer a competitive salary, based on experience. Our Company Paid Benefits Package is comprehensive and includes; Major-Medical, Hospitalization, Dental, Family Life Insurance, Retirement, Relocation Allowances, and much more.

Please send your resume in the strictest confidence, including salary history and requirements, to:

L. KENNETH BREWER
Personnel Department
SERVICE MERCHANDISE CO., INC.
2968 Foster Creighton Drive
Nashville, Tennessee 37204

OR CALL TOLL FREE
1-800-251-8459

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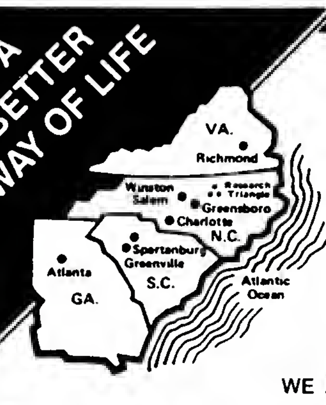

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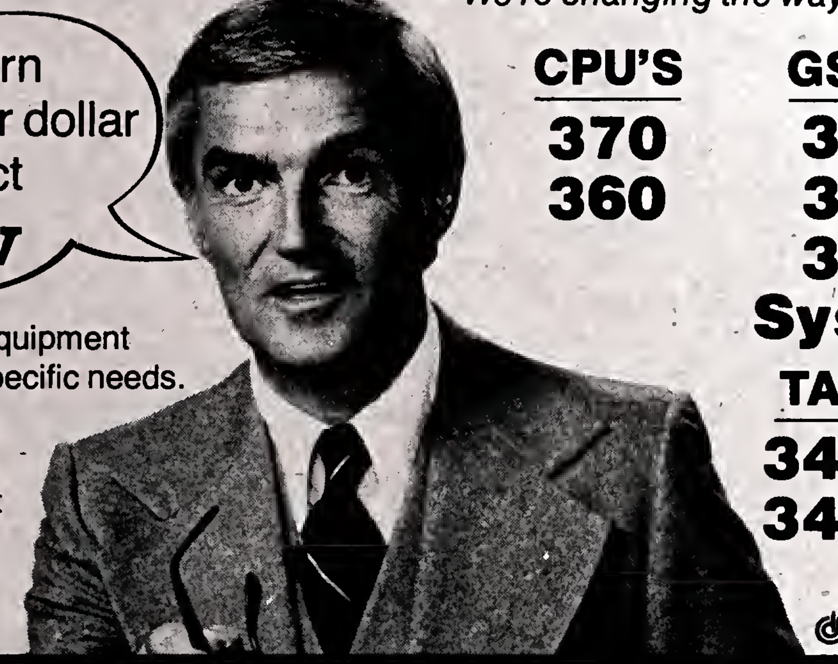

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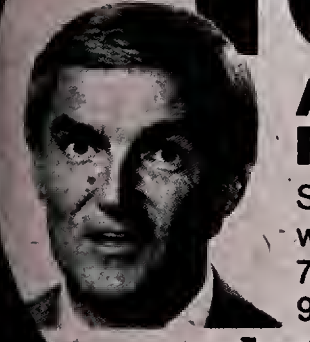

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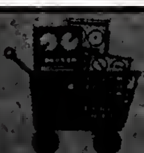

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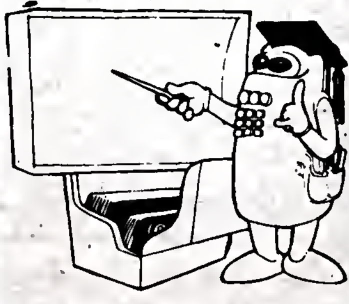

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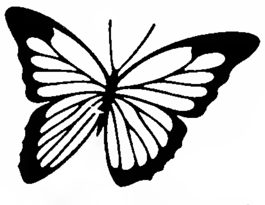

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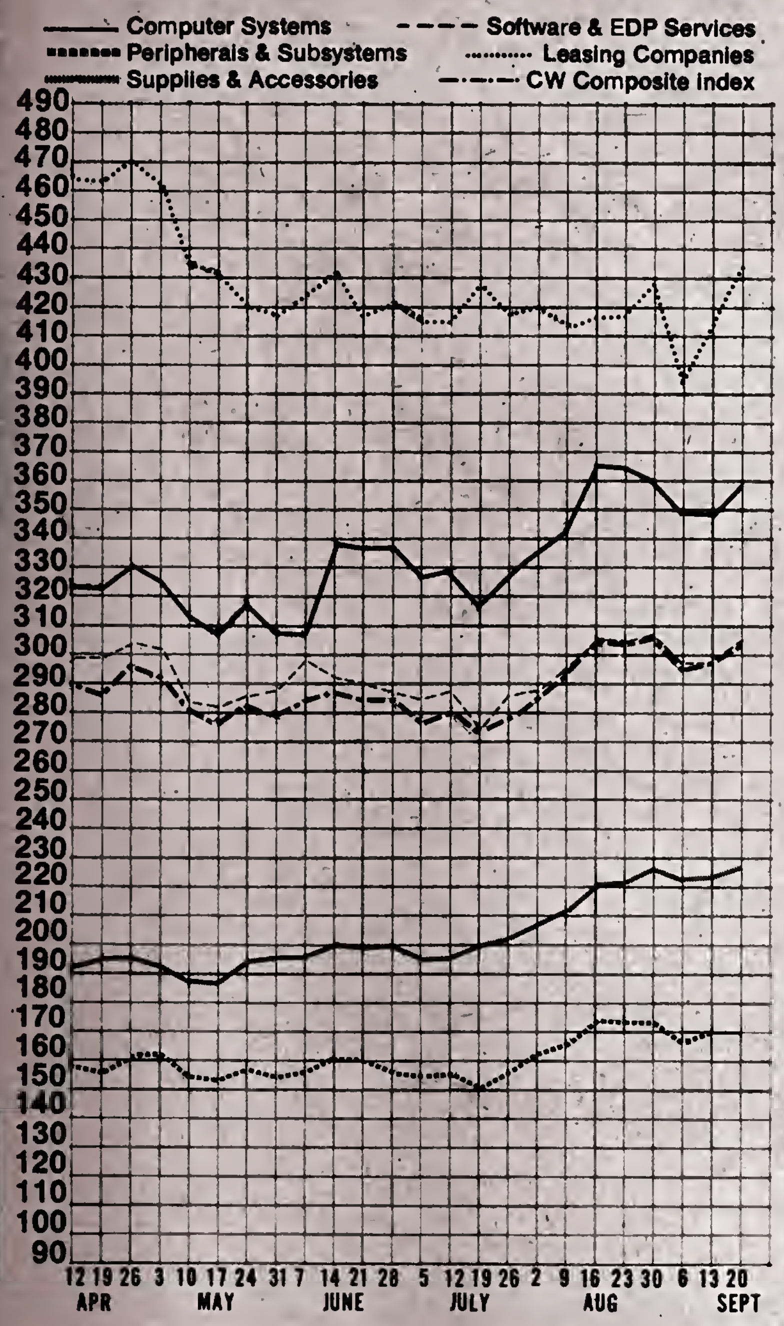

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TRADE QUOTES

## Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPTEMBER 19, 1979

All statistics complied, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1978-79 RANGE (1) | CLOSE SEP 19 1979 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | AMDAHL CORP | 22- 69 | 22 | - 7/8 | -3.8 |
| N | BURROUGHS CORP | 59- 87 | 72 | + 3/4 | +1.0 |
| D | COMPUTER AUTOMATION | 11- 44 | 11 | - 1/2 | -4.3 |
| N | CONTROL DATA CORP | 23- 48 | 47 3/8 | +2 | +4.4 |
| D | CRAY RESEARCH INC | 8- 39 | 37 1/4 | +2 3/4 | +7.9 |
| N | DATA GENERAL CORP | 42- 74 | 67 5/8 | +1 1/2 | +2.2 |
| N | DATAPOINT CORP | 34- 88 | 85 5/8 | + 7/8 | +1.0 |
| N | DIGITAL EQUIPMENT | 39- 65 | 63 1/4 | +1 7/8 | +3.0 |
| N | ELECTRONIC ASSOC. | 2- 13 | 8 5/8 | +1 1/8 | +15.0 |
| A | ELECTRONIC ENGINEER. | 9- 19 | 14 1/2 | + 1/4 | +1.7 |
| N | FOUR-PHASE SYSTEMS | 19- 46 | 37 | +2 | +5.7 |
| N | FOXBORO | 28- 44 | 38 1/2 | -1 5/8 | -4.0 |
| D | GENERAL AUTOMATION | 7- 26 | 14 1/2 | + 1/4 | +1.7 |
| D | GRI COMPUTER CORP | 1- 3 | 1 | 0 | 0.0 |
| N | HEWLETT-PACKARD CO | 24- 57 | 57 | +3 1/4 | +6.0 |
| N | HONEYWELL INC | 43- 82 | 78 | - 1/4 | -0.3 |
| N | IBM | 66-321 | 67 3/4 | +1 1/4 | +1.8 |
| D | MANAGEMENT ASSIST | 9- 29 | 22 3/8 | + 3/8 | +1.7 |
| D | MANUFACTURING DATA S | 9- 33 | 32 | + 3/4 | +2.3 |
| D | MICRODATA CORP | 10- 32 | 31 3/4 | 0 | 0.0 |
| D | MINI-COMPUTER SYST | 4- 8 | 4 1/4 | + 1/2 | +13.3 |
| D | MODULAR COMPUTER SYS | 7- 18 | 14 | +1 1/8 | +8.7 |
| N | NCR | 37- 81 | 75 1/8 | - 1/8 | -0.1 |
| N | PRIME COMPUTER INC | 9- 22 | 17 1/4 | - 3/8 | -2.1 |
| N | PERKIN-ELMER | 17- 34 | 30 3/4 | +1 1/2 | +5.1 |
| N | SPERRY RAND | 33- 52 | 49 3/4 | + 1/8 | +0.2 |
| A | SYSTEMS ENG. LABS | 11- 24 | 13 3/4 | + 3/4 | +5.7 |
| D | TANDEM COMPUTERS INC | 13- 37 | 33 3/4 | +1 1/2 | +4.6 |
| A | WANG LABS. | 6- 25 | 23 | 0 | 0.0 |

### LEASING COMPANIES

| EXCH | | PRICE 1978-79 RANGE (1) | CLOSE SEP 19 1979 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| D | BOOTHE COURIER CORP | 13- 21 | 17 | 0 | 0.0 |
| D | COMDISCO INC | 3- 21 | 16 | + 1/4 | +1.5 |
| A | COMMERCE GROUP CORP | 1- 1 | 1/2 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1- 7 | 3 1/4 | - 1/8 | -3.7 |
| D | CONTINENTAL INFO SYS | 4- 15 | 3 1/2 | 0 | 0.0 |
| M | DATRONIC RENTAL | 1- 4 | 2 7/8 | 0 | 0.0 |
| A | DCL INC | 3- 5 | 5 1/4 | 0 | 0.0 |
| N | OPF INC | 8- 14 | 10 | - 3/8 | -3.6 |
| N | ITEL | 9- 36 | 9 3/8 | + 1/8 | +1.3 |
| N | LEASCO CORP | 24- 55 | 55 3/8 | +3 1/2 | +6.7 |
| D | LEASPAC CORP | 1- 4 | 3/4 | + 1/4 | +50.0 |
| A | PIONEER TEX CORP | 3- 7 | 3 | + 1/4 | +9.0 |
| N | U.S. LEASING | 13- 20 | 16 3/8 | + 1/8 | +0.7 |

### SOFTWARE & EDP SERVICES.

| EXCH | | PRICE 1978-79 RANGE (1) | CLOSE SEP 19 1979 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| D | ADVANCED COMP TECH | 1- 2 | 1 3/8 | + 1/8 | +10.0 |
| D | ANACOMP INC | 8- 24 | 24 1/4 | +9 1/2 | +64.4 |
| A | APPLIED DATA RES. | 8- 17 | 11 7/8 | +1 1/2 | +14.4 |
| N | AUTOMATIC DATA PROC | 24- 37 | 36 1/8 | + 7/8 | +2.4 |
| D | COMPU-SERV NETWORK | 5- 16 | 14 | 0 | 0.0 |
| D | COMPUTER HORIZONS | 1- 9 | 2 3/4 | - 1/4 | -8.3 |
| D | COMPUTER NETWORK | 5- 16 | 5 3/4 | - 1/8 | -2.1 |
| N | COMPUTER SCIENCES | 8- 17 | 15 1/2 | - 1/8 | -0.7 |
| D | COMPUTER TASK GROUP | 1- 7 | 6 1/2 | 0 | 0.0 |
| D | COMPUTER USAGE | 2- 4 | 2 1/2 | + 1/8 | +5.2 |
| D | COMPUT AUTO REP SVC | 4- 10 | 6 1/2 | 0 | 0.0 |
| D | COMSHARE | 6- 26 | 15 3/4 | - 3/4 | -4.5 |
| D | CULLINANE CORP | 14- 33 | 23 1/2 | 0 | 0.0 |
| D | DATA DIMENSIONS INC | 2- 9 | 2 | - 1/8 | -5.8 |
| D | DATATAB | 1- 4 | 2 1/4 | - 1/8 | -5.2 |
| N | ELECTRONIC DATA SYS. | 15- 28 | 24 7/8 | + 7/8 | +3.6 |
| D | INSYTE CORP | 1- 3 | 1 5/8 | 0 | 0.0 |
| D | IPS COMPUTER MARKET. | 2- 3 | 3 | 0 | 0.0 |
| D | KEANE ASSOCIATES | 3- 6 | 5 1/8 | 0 | 0.0 |
| D | KEYDATA CORP | 1- 4 | 3 7/8 | - 1/8 | -3.1 |
| A | LOGICON | 10- 19 | 15 1/2 | - 1/4 | -1.5 |
| D | NATIONAL DATA CORP | 7- 16 | 14 1/2 | + 3/8 | +2.6 |
| A | ON LINE SYSTEMS INC | 12- 30 | 24 3/4 | + 1/8 | +0.5 |
| N | PLANNING RESEARCH | 4- 10 | 6 1/2 | - 1/2 | -7.1 |
| D | PROGRAMMING & SYS | 1- 1 | 1 1/8 | + 1/8 | +12.5 |
| D | RAPIDATA INC | 3- 7 | 4 1/8 | 0 | 0.0 |
| D | REYNOLDS & REYNOLD | 18- 36 | 31 3/4 | +1 1/4 | +4.0 |
| D | SCIENTIFIC COMPUTERS | 3- 9 | 7 3/8 | - 3/8 | -4.8 |
| N | TYMSHARE INC | 18- 44 | 42 7/8 | - 1/8 | -0.2 |
| A | URS SYSTEMS | 5- 8 | 7 | + 1/4 | +3.7 |
| N | WYLY CORP | 1- 7 | 5 7/8 | - 1/2 | -7.8 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1978-79 RANGE (1) | CLOSE SEP 19 1979 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 13- 32 | 17 1/4 | - 1/8 | -0.7 |
| N | AMPEX CORP | 10- 19 | 18 3/8 | + 5/8 | +3.5 |
| D | ANDERSON JACOBSON | 5- 12 | 11 1/4 | 0 | 0.0 |
| N | APPLIED DIG DATA SYS | 8- 22 | 8 7/8 | - 1/4 | -2.7 |
| D | BEEHIVE INT'L | 3- 7 | 4 7/8 | - 3/8 | -7.1 |
| A | BOLT,BERANEK & NEW | 6- 15 | 15 | +1 3/8 | +10.0 |
| N | BUNKER-RAMO | 10- 29 | 25 1/4 | + 1/2 | +2.0 |
| A | CALCOMP | 3- 13 | 9 7/8 | -2 1/4 | -18.5 |
| D | CAMBRIDGE MEMORIES | 2- 9 | 2 | - 1/4 | -11.1 |
| N | CENTRONICS DATA COMP | 16- 54 | 50 3/4 | 0 | 0.0 |
| D | COGNITRONICS | 1- 4 | 2 1/2 | - 1/8 | -4.7 |
| D | COMPUTER COMMUN. | 6- 10 | 8 1/4 | 0 | 0.0 |
| D | COMPUTER CONSOLES | 4- 16 | 13 | 0 | 0.0 |
| A | COMPUTER EQUIPMENT | 3- 6 | 5 1/8 | 0 | 0.0 |
| D | COMPUTER TRANSCEIVER | 1- 5 | 4 | 0 | 0.0 |
| D | COMPUTERVISION CORP | 5- 36 | 35 5/8 | +2 7/8 | +8.7 |
| N | CONRAC CORP | 13- 26 | 16 3/4 | + 3/8 | +2.2 |
| A | DATA ACCESS SYSTEMS | 0- 10 | 7 7/8 | - 1/4 | -3.0 |
| A | DATA PRODUCTS CORP | 13- 25 | 16 7/8 | - 5/8 | -3.5 |
| D | DATUM INC | 2- 6 | 2 3/8 | 0 | 0.0 |
| D | DECISION DATA COMPUT | 2- 6 | 4 1/4 | 0 | 0.0 |
| D | DELTA DATA SYSTEMS | 1- 1 | 5/8 | 0 | 0.0 |
| A | DOCUMATION INC | 6- 34 | 22 | - 1/2 | -2.2 |
| D | DATARAM CORP | 6- 32 | 23 1/2 | +1 1/2 | +6.8 |
| N | ELECTRONIC M & M | 3- 9 | 3 5/8 | - 1/8 | -3.3 |
| D | FABRI-TEK | 1- 2 | 7/8 | 0 | 0.0 |
| D | GENERAL COMPUTER SYS | 1- 3 | 2 3/4 | + 1/4 | +10.0 |
| D | GENERAL DATACOMM IND | 9- 21 | 17 1/2 | +1 | +6.0 |
| N | HAZELTINE CORP | 10- 18 | 17 | + 3/4 | +4.6 |
| N | HARRIS CORP | 17- 36 | 32 1/2 | +2 | +6.5 |
| D | INFOREX INC | 4- 11 | 4 3/8 | - 3/8 | -7.8 |
| D | INFORMATION INTL INC | 7- 12 | 8 3/4 | + 1/4 | +2.9 |
| D | INFOTON | 1- 3 | 2 3/4 | - 1/8 | -4.3 |
| D | INTEL CORP | 26- 60 | 60 | +2 1/2 | +4.3 |
| D | INTERSIL | 7- 21 | 20 | +1 1/4 | +6.6 |
| A | LUNDY ELECTRONICS | 4- 8 | 6 1/2 | - 1/2 | -7.1 |
| D | MSI DATA CORP | 7- 19 | 7 3/4 | + 1/4 | +3.3 |
| N | MEMOREX | 23- 59 | 22 3/4 | -1 1/2 | -6.1 |
| N | MOHAWK DATA SCI | 6- 15 | 13 1/8 | + 1/2 | +3.9 |
| D | OMEX | 2- 8 | 7 1/2 | + 1/2 | +7.1 |
| D | PARADYNE CORP | 9- 22 | 20 3/8 | -1 | -4.6 |
| D | PENRIL CORP | 5- 12 | 9 5/8 | - 3/4 | -7.2 |
| N | PERTEC CORP | 8- 17 | 11 1/2 | - 3/8 | -3.1 |
| A | POTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| D | RECOGNITION EQUIP | 6- 13 | 7 | - 1/8 | -1.7 |
| D | SCAN DATA | 1- 5 | 1 7/8 | 0 | 0.0 |
| N | STORAGE TECHNOLOGY | 15- 46 | 17 1/8 | - 1/4 | -1.4 |
| D | T BAR INC | 11- 25 | 24 1/2 | +2 | +8.8 |
| D | TALLY CORP. | 4- 14 | 12 3/4 | 0 | 0.0 |
| A | TEC INC | 6- 13 | 8 1/4 | 0 | 0.0 |
| N | TEKTRONIX INC | 33- 60 | 59 1/4 | +1 3/4 | +3.0 |
| N | TELEX | 3- 9 | 4 3/4 | + 1/8 | +2.7 |
| D | TESDATA SYSTEMS CP | 9- 26 | 10 7/8 | - 3/8 | -3.3 |
| D | WILTEK INC | 1- 2 | 1/2 | 0 | 0.0 |

### SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1978-79 RANGE (1) | CLOSE SEP 19 1979 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | AMERICAN BUS PRODS | 6- 12 | 12 | +1 1/2 | +14.2 |
| D | BALTIMORE BUS FORMS | 1- 4 | 3/4 | 0 | 0.0 |
| N | BARRY WRIGHT | 14- 34 | 20 1/2 | + 1/8 | +0.6 |
| D | CYBERMATICS INC | 1- 1 | 1 | 0 | 0.0 |
| D | DUPLEX PRODUCTS INC | 13- 31 | 28 3/8 | + 7/8 | +3.1 |
| N | ENNIS BUS. FORMS | 5- 21 | 18 1/8 | - 7/8 | -4.6 |
| N | 3M COMPANY | 43- 66 | 52 5/8 | - 3/8 | -0.7 |
| D | MOORE CORP LTD | 26- 34 | 32 1/2 | - 1/2 | -1.5 |
| N | NASHUA CORP | 18- 37 | 30 | - 1/4 | -0.8 |
| D | STANDARD REGISTER | 20- 29 | 27 1/2 | + 1/4 | +0.9 |
| A | TAB PRODUCTS CO | 8- 19 | 18 | + 1/4 | +1.4 |
| A | WABASH MAGNETICS | 10- 22 | 16 1/4 | + 3/4 | +4.8 |
| N | WALLACE BUS FORMS | 18- 33 | 28 1/4 | +1 5/8 | +6.1 |

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EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; D=OVER-THE-COUNTER
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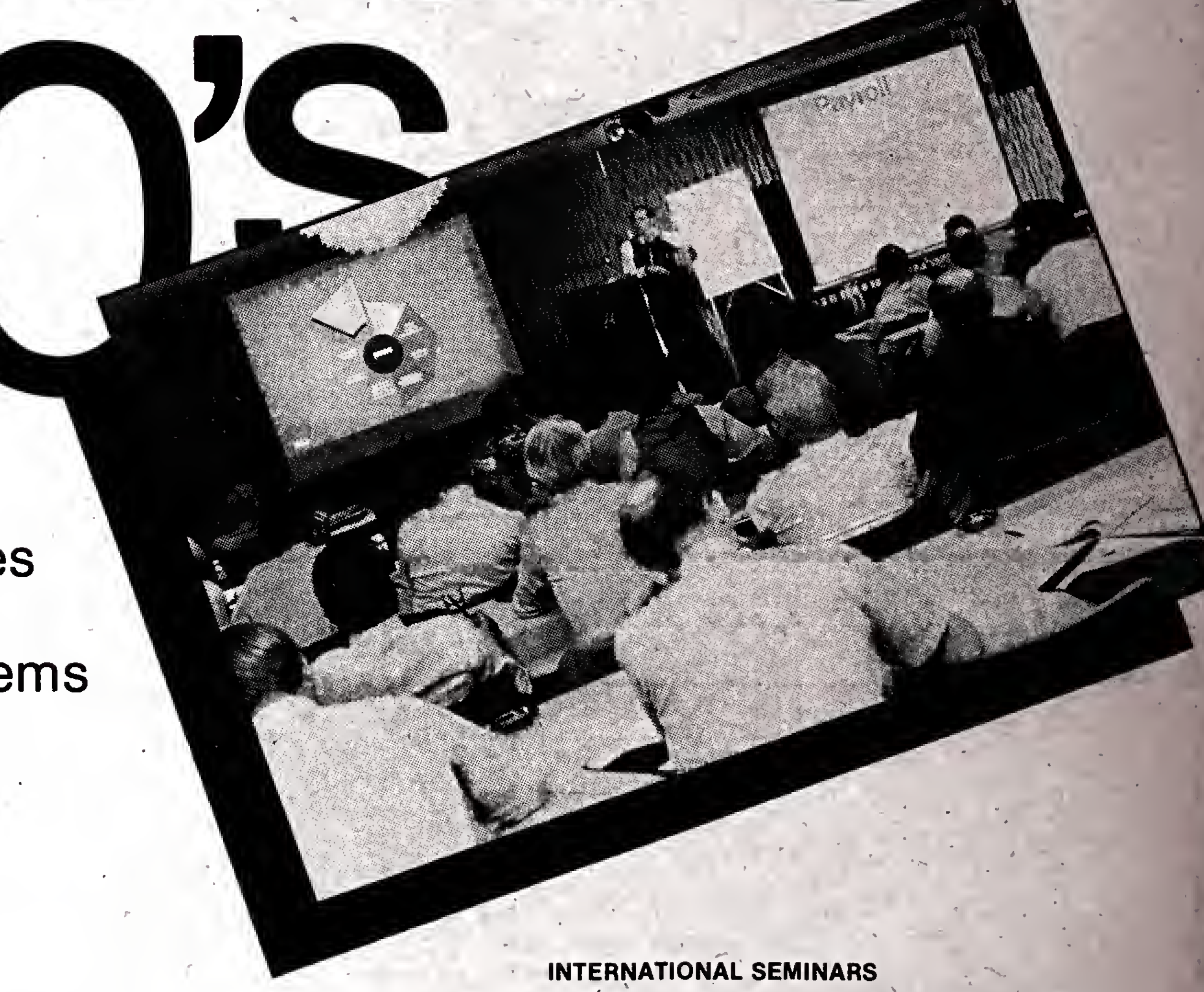

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**Los Angeles, CA** September 11
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**New York City, NY** September 25
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**Rochester, NY** October 2
**St. Louis, MO** October 11
**Salt Lake City, UT** September 19
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**Tulsa, OK** October 10
**Washington, D.C.** October 3

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**Auckland, New Zealand** October 31
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**Leeds, England** January 31
**London, England** August 30
**London, England** November 29
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**Melbourne, Australia** October 13
**Melbourne, Australia** November 15
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